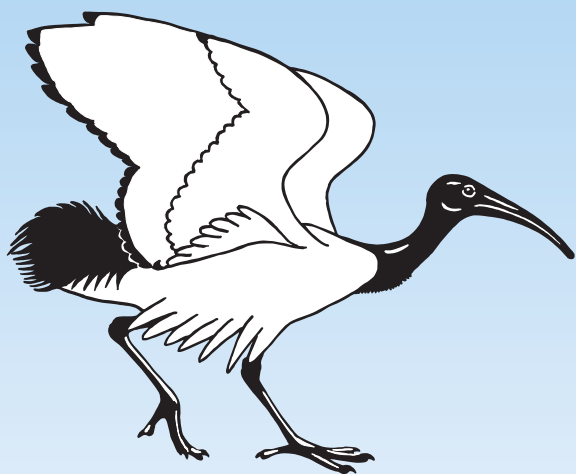


Bulletin of the British Ornithologists' Club



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FORTHCOMING MEETINGS

See also BOC website: <http://www.boc-online.org>

BOC MEETINGS are open to **all**, not just BOC members, **and are free**.

Evening meetings are in **an upstairs room at The Barley Mow, 104 Horseferry Road, Westminster, London SW1P 2EE**. The nearest Tube stations are Victoria and St James's Park; and the 507 bus, which runs from Victoria to Waterloo, stops nearby. For maps, see http://www.markettaverns.co.uk/the_barley_mow.html or ask the Chairman for directions.

The cash bar opens at **6.00 pm** and those who wish to eat after the meeting can place an order. **The talk will start at 6.30 pm** and, with questions, will last c.1 hour.

It would be very helpful if those intending to come can notify the Chairman no later than the day before the meeting.

Tuesday 10 March 2015—6.30 pm—Dr Clemency Fisher—A jigsaw puzzle with many pieces missing: reconstructing a 19th-century bird collection

Abstract: In 1838–45, ‘The Birdman’ John Gould’s assistant, John Gilbert, collected more than 8% of the bird and mammal species of Australia for the first time. He sent hundreds of specimens back to Gould, who used many of them to describe new species and then recouped his outlay by selling the specimens to contacts all over the world. Some of the new owners removed Gilbert’s labels and mounted their specimens for display; some put new ones on, or placed their specimens into poor storage where both specimen and label were eaten by beetle larvae. Still other were swapped, listed as ‘duplicates’, or discarded. Reconstructing Gilbert’s collections has been a monumental task over the last 35 years, aided greatly by a recent Leverhulme Trust Research Fellowship. The huge database developed has made it possible to see patterns and links in what is in effect a jigsaw puzzle with few pieces, and many of which are damaged.

Biography: Clemency Fisher is Senior Curator of Vertebrate Zoology at National Museums Liverpool, where she has worked for c.40 years. Although her primary research concerns John Gilbert, she was awarded the John Thackray medal for her work on Edward Stanley, 13th Earl of Derby, whose collections founded the then Liverpool Museum and which she now curates. She is a committee member of the Edward Lear Society, being responsible for promoting Lear’s zoological artworks, and has also worked on bats, bird bones from archaeological digs and the history of wildlife art. Clem also spent part of her time in 2006–11 as Natural History Liaison Officer for the Museum of Liverpool content team, researching local history (especially that of Toxteth Deer Park) for the new museum’s displays.

Tuesday 19 May 2015—5.30 pm—Annual General Meeting, followed at 6.30 pm by Henry McGhie—Who do you think you are, Henry Dresser? Birds, books and business

Abstract: This talk will explore the life, work and legacy of Henry Dresser (1838–1915), one of the most productive ornithologists of the 19th century. His life spanned the period of development of institutionalised scientific ornithology, and bird conservation in Britain. He was one of the architects of British conservation legislation and a key mover in standardising ornithology in Britain and Europe, via his publications and activity in scientific society. He is most famous for the *History of the birds of Europe*, nine sumptuous volumes illustrated by leading artists of the day. In later years, Dresser was the conduit by which incredible discoveries in Siberia were made known to Western science.

Biography: Henry McGhie is Head of Collections and Curator of Zoology at Manchester Museum, part of the Univ. of Manchester. He has a background as a bird ecologist, with particular interests in moorland bird ecology and historical ecology. He has been working on a biography of Henry Dresser for the last ten years, with a view to publication in 2016.

A further Tuesday evening meeting in 2015 is scheduled for **22 September**. In addition, a one-day joint meeting with the Ornithological Society of the Middle East and the Natural History Museum, focused on Middle Eastern birds, will take place in the Flett Theatre, Natural History Museum, South Kensington, on Saturday **21 November**.

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CLUB ANNOUNCEMENTS

ANNUAL GENERAL MEETING

The Annual General Meeting of the British Ornithologists' Club will be held in the upstairs room at The Barley Mow, Horseferry Road, Westminster, London SW1P 2EE, at 5.30 pm on Tuesday 19 May 2015.

AGENDA

1. Apologies for absence.
2. Minutes of the Annual General Meeting held on Tuesday 20 May 2014 (see *Bull. Brit. Orn. Cl.* 134: 165–166, and the BOC website).
3. Receive and consider the Chairman's Review, The Trustees' Report and Accounts for 2014 (these will be available in the room before the start of the meeting).
4. The Bulletin Editor's Report—Mr G. M. Kirwan.
5. Election of Trustees. The Committee proposes that:
 - i. Mr N. Redman be elected as Vice-Chairman *vice* Mr D. J. Fisher
 - ii. Mr S. Chapman and Mr A. Simmons (*vice* Mr R. R. Langley) be elected to serve as Trustees.
 - iii. Mr K. F. Betton has decided to step down as a Trustee and nominations are invited for the resultant vacancy.
6. Any other business (*any items should be received by the Hon. Secretary by 5 May 2015*)

Notes to the Agenda of the 2015 AGM

Item 5: Trustee nominees for election.

Stephen Chapman

Master Mariner, Fellow of the Nautical Institute, MBOU and lifetime birdwatcher, with first short note on predation of Coot *Fulica atra* nests published in his school magazine in 1958, Stephen is an active observer on behalf of the British Trust for Ornithology, as well as Vice-Chairman and database manager with the Royal Naval Bird Watching Society. Outside of these interests, he enjoys tall-ship sailing with the Jubilee Sailing Trust, is Chairman of the Southwater Scout Executive, and a recent Chairman of the Southwater Community Partnership. He retired from a career in shipping and marine consulting.

Alick Simmons

A 58-year-old veterinarian with a lifelong interest in wildlife observation, photography and conservation. After qualifying in 1978 and several years in private practice, he became a government veterinarian working overseas, culminating in his present role as the UK government's Deputy Chief Veterinary Officer. He has been watching birds since his early teens and has contributed over the years to various surveys and conservation efforts. During the last ten years he has further developed his interest in photography, travelling extensively to observe and photograph wildlife. In addition, he takes a keen interest in animal welfare and is a Council member of the Universities Federation for Animal Welfare and a trustee of the Humane Slaughter Association. Married with two children, he lives in Somerset.

The 978th meeting of the Club was held on Tuesday 23 September 2014 in the upstairs room at The Barley Mow, 104 Horseferry Road, Westminster, London SW1P 2EE. Twenty members and seven non-members were present. Members attending were: Miss H. BAKER, Mr P. BELMAN, Mr K. F. BETTON, Cdr. M. B. CASEMENT, RN, Mr S. CHAPMAN, Mr D. J. FISHER, Mr M. GAUNTLETT, Dr A. GOSLER (*Speaker*), Mr P. JACKSON, Mr R. LANGLEY, Mr R. MALIN, Dr C. F. MANN, Mr D. J. MONTIER, Dr R. PRYS-JONES, Mr R. PRYTHERCH, Mr N. J. REDMAN, Dr P. RUDGE, Mr A. SIMMONS, Mr S. A. H. STATHAM and Mr C. W. R. STOREY (*Chairman*).

Non-members attending were: Mrs C. CASEMENT, Mr A. CHEKE, Mrs J. EVANS, Mrs M. GAUNLETT, Miss J. HADDON, Mrs B. HARRISON and Mr A. J. STONES.

Dr Andy Gosler spoke on *From ornithology to ethno-ornithology*. "As an ornithologist, I am fascinated by birds. As an ethno-ornithologist, I am fascinated that I am fascinated by birds!" was how Andy started his thought-provoking talk, which was partly a testimony of his personal career journey from ornithology, in which he became interested at the age of ten, to ethno-ornithology—the study of human relationships with

birds, in which as an experienced bird ringer he was inevitably embedded. His ornithological research over 30 years, mostly in connection with the Edward Grey Institute's world-renowned long-term population study of Great Tits *Parus major* in Wytham Woods, Oxford, had been focused chiefly on the question of adaptation—first on the eco-morphology of the birds' bills, and most recently on the adaptive function of protoporphyrin pigment spots on Great Tit eggs (a pattern that is common to the eggs of numerous small passerines). These studies had been the subjects of previous talks to the Club over the years, but in addition to their ornithological value, they had led to one realisation: that it is impossible to study ecology today without taking anthropogenic effects into account. For example, acid precipitation was probably the cause of long-term change in the pigmentation patterns of the tits' eggshells, which suggested a 6% decline in shell thickness due to a reduced availability of calcium in Wytham soils.

From this point, Andy switched the focus of his talk to the relationship between humans and birds. He pointed out that attention to birds was a human universal that to the best of our knowledge has been reflected to some extent in every one of the 7,000 cultures (based on language groups) on Earth. Furthermore, across countries, avian and linguistic diversity appear correlated, although the causes of the correlation were likely to be complex and diverse. Despite these relationships, most conservationists hadn't appreciated the importance of human cultural connections with birds for the promotion of bird conservation. This was a particular concern now since linguistic diversity was declining in parallel with loss of biodiversity; with the loss of languages went local knowledge of plants and animals encoded within those languages. A good example is from the UK, where general knowledge of natural history was in sharp decline (Andy presented data from his recent study of Oxford biology undergraduates showing that half couldn't name five British birds), and that it was a truism to say that people will not work to save what they did not know. Finally he presented data from his own study of 3,290 recorded folk names (collated by etymologist Michel Deshayes) of 78 passerines, showing the strong significance that birds had had in English folk culture pre-1900. Andy is director of a new project in collaboration with BirdLife International, the Ethno-ornithology World Archive, which seeks to collect folk knowledge of birds globally, and subject to permissions from knowledge-holders, share this online: www.zoo.ox.ac.uk/egi/research-at-the-egi/ethno-ornithology-world-archive-ewa/

Joint meeting on Asian Birds with the Oriental Bird Club and Natural History Museum, London, 22 November 2014

Around 140 people attended this excellent joint meeting and were rewarded with a superb range of talks. Pamela Rasmussen set the scene by reviewing the new species and rediscoveries of Asian birds that have occurred in recent times. Since 1998, working with co-authors she has, of course, described six new Asian bird species herself. Primarily, her talk described the processes involved in looking for such species, both in the museum and in the field. The audience enjoyed the stories behind the rediscovery or discovery of several notable species, including Forest Owlet *Heteroglaux blewitti*, Serendib Scops Owl *Otus thilohoffmanni* and Flores Scops Owl *O. alfredi*—to mention just three.

Debbie Pain then reported the latest news in the international plan to save the Spoon-billed Sandpiper *Eurynorhynchus pygmaeus*. Survey work along the Chinese coastline has found 226 birds at three coastal sites, against a background of massive habitat loss and a significant level of trapping. Meanwhile, on the breeding grounds in Chukotka, Russia, huge efforts are underway to help the birds to achieve higher fledging success by reducing their exposure to potential predators. In parallel, there is also the UK captive-breeding programme that looks set to succeed soon.

Next, Chris Gooddie gave us an insight into the birding opportunities at Bukit Barisan Selatan National Park, where 415 bird species have been reported to date. Located in the Bukit Barisan Mountains in Sumatra, the park has a total area of 3,568 km², and spans three provinces. It was the site of the rediscovery of Sumatran Ground Cuckoo *Carpococcyx viridis* in 1997, the first sighting in 81 years. Chris certainly put the case that this park deserves more attention from birders.

After the lunch break, Stuart Marsden outlined recent work on the success or otherwise of large frugivorous birds inside and outside protected areas in Asia. The results of this work have shown that frugivores are seriously threatened due to habitat loss and hunting. His research team has surveyed 25 species of pigeons, parrots and hornbills over nearly 500 km of line transects on Luzon in the Philippines. They noted an absence of large parrots from many sites with apparently intact habitat, and even where they are present, these species exhibited lower densities than related species in similar habitat in mainland Southeast Asia. However, those in protected areas have fared better in most cases.

Robert Prýs-Jones then outlined the amazing life of Allan Octavian Hume, often referred to as the 'Pope' of south Asian ornithology. Born in 1829, Hume had a varied life as a civil servant, political reformer and ornithologist. Much of his adult life was spent in British India where seemingly he soon began accumulating a personal collection of bird specimens, which was destroyed during the violent rebellion of 1857. However, Hume started again and eventually amassed a huge collection of almost 100,000 specimens collected by himself and others—at that time, the largest of its type anywhere in the world. Hume kept details of every specimen in his collection, but tragically these were stolen and sold off as waste paper by a servant in 1883. This was a huge blow to him personally, but also to the world of ornithology, as he had intended to write a definitive book on the birds of British India. Hume subsequently lost his interest in collecting and

ornithology, but passed his collection to the British Museum (Natural History), now in Tring, where it retains its importance as key reference material.

Finally, Per Alström shared his most recent work on a range of warblers and larks using DNA to reveal some unexpected relationships and cryptic species. He showed how DNA analysis has revolutionised phylogenetic studies. Not only have DNA sequences become easier to obtain, but more powerful computers have enabled more rigorous assessments of their relationships. His examples showed how some species have evolved strikingly different features from their close relatives, potentially obscuring their relationships, and his work has revealed a number of new species across Asia.

Both this and the first talk of the day proved that there is still much to be discovered in Asian ornithology based on a combination of rigorous field work and ever-more powerful analysis.

Keith Betton

OBITUARIES

Philip Arthur Dominic Hollom (1912–2014)

Born on 9 June 1912 in Bickley, Kent, Phil Hollom (affectionately known as PADH to some) was to become a birding hero to many amateur ornithologists. He authored and co-authored several of the key books that helped birdwatchers to improve their field skills from the 1950s onwards. He reached the great age of 102 before his death on 20 June 2014.

Phil's first memory of birds was of being lifted up at the age of four to peer into the nest of a Song Thrush *Turdus philomelos*. The memory was as clear to him nearly 100 years later, and he told his friends how he could still recall the beautiful mud-lined nest and the bright blue eggs that it contained. As a boy he was fascinated by birds and used to catch them using a garden sieve held up with a twig and a piece of string. In the 1920s, it was the only way that he was able to handle birds.

Between the ages of ten and 14 he attended Heddon Court School in Cockfosters. The headmaster recognised his interest in birds and allowed Phil to wander around the neighbouring agricultural land. He was the only boy permitted to do this. In 1926 he moved to King's School in Bruton. There were many nesting birds nearby, so Phil decided to carry out an intensive study.

By 1928, Phil had met a fellow teenage bird enthusiast in his village called Tom Harrison. Harry Witherby was then in charge of the national bird ringing scheme and Phil and Tom were regular visitors to Harry's house on Chobham Common, Surrey, where they were taught the finer details of bird study. In the summer of 1929 Phil ringed >250 Barn Swallows *Hirundo rustica*. In fact, he continued his studies of these birds in Bruton well into his early nineties—making an annual trip from his Surrey home to do so.

On leaving school at 17, Phil got a job, but continued his bird studies, being guided by Harry Witherby and Max Nicholson, and in 1931, when just 19 years old, he jointly organised a national survey of Great Crested Grebes *Podiceps cristatus* with Tom, at a time when many new gravel pits were being excavated around west London but none was shown on the available maps. Eager not to miss any potential grebe habitat, Phil met the Marquis Masa U. Hachisukato at a BOC dinner and the two men discussed a solution to the problem. Not only was the Marquis a member of the Japanese Royal family, he was also a keen pilot. A few days later they took to the air, making several low passes over west London, with Phil marking all of the new gravel pits on his map.

As a young man he attended many BOC meetings and was also invited to join the London-based 1937 Bird Club. He soon found himself dining on a regular basis with several others who were to shape the face of British ornithology over the next half-century. He joined BOC Committee in 1938, but was forced to stand down when his wartime duties had to take priority.

In 1940 Phil joined the Royal Air Force and travelled to Pensacola in Florida to learn how to fly. He spent eight months there. Between 1942 and 1946 he was based in various places around the country and was honoured to fly VIPs on special visits. These included the Archbishop of York and the Anglo-American Committee on Palestine, who he spent six weeks transporting around the Middle East and Europe in a Dakota. It was these visits that made him realise that there was no book to help people identify birds in Europe.

With his wartime commitments behind him, Phil rejoined BOC Committee in 1947–49 (and again in 1959–63). He spoke warmly of the friendships he made at the Club. At least one member was keen to take advantage of Phil's regular journeys around Europe. Richard Meinertzhagen gave him a list of cheeses that he hoped might be obtained on his behalf!

In 1952 Phil published his first book, *The popular handbook of British birds*. However, he was frustrated that there was still no European field guide to birds. By chance he met Guy Mountfort, founder of the World Wildlife Fund, who had exactly the same idea to publish such a book. Over lunch they discussed their separate plans, but as Mountfort had already signed up Roger Tory Peterson to illustrate his book, Phil was quickly persuaded to join the team. The result—in 1954—was *A field guide to the birds of Britain and Europe*. It was a groundbreaking work and has since appeared in many languages.

Guy Mountfort organised several major birdwatching expeditions to Europe and the Middle East, and Phil was always invited to join them—to the Coto Doñana in south-west Spain in 1957, Bulgaria in 1960

and Jordan in 1963. They ignited Phil's fascination for travel, and he visited Syria, Turkey, Iran, Tunisia and Morocco, among more than 50 countries, and was able to watch birds in most of them, reporting the more interesting discoveries in *Ibis*. These trips resulted in him co-authoring yet another book, *Birds of the Middle East and North Africa* in 1988.

Phil's last contribution to ornithological literature was in the 1970s and 1980s, when Max Nicholson brought together a team to create *The birds of the Western Palearctic*. The nine volumes appeared between 1977 and 1994, and Phil wrote and checked much of the text. He also contributed a large number of sound-recordings from his travels, which were displayed as sonograms. The British Library has all of his most important recordings archived.

Phil Hollom was a modest man who shunned the limelight, and always seemed to be slightly surprised by the popularity of his books. In creating the *Popular handbook* in 1952, and co-authoring *A field guide to the birds of Britain and Europe* (universally known as 'Peterson, Mountfort and Hollom'), he made birds more accessible to everyone. His contribution to ornithology was recognised by the Royal Society for the Protection of Birds, British Trust for Ornithology and BOU, all of which awarded him medals for his achievements. He was also made an Honorary Member of the BOC after celebrating 50 years of membership.

Keith Betton

Hiroyuki Morioka (1931–2014)

Morioka-sensei, known to many friends as Luuk, died in Tokyo last December, leaving a daughter. He graduated from Kyoto University in 1960 and subsequently undertook post-graduate work at the University of Illinois under Walter Bock, studying the anatomy and relationships of thrushes, mimic thrushes, dippers and wrens. He took his Ph.D. there in 1967 and in the same year he worked as a researcher at the Dept. of Ornithology, American Museum of Natural History, New York.

On returning to Japan he joined the National Science Museum in Tokyo, became Curator of Birds in 1972, Head of the Division of Tetrapoda in 1982, and then Director of the Dept. of Zoology in 1995. In 1996 he was appointed Curator Emeritus of the museum. He was thus the museum's main correspondent with ornithologists around the world for almost 25 years. In addition to curatorial duties, he managed to spend time in the field not just in Japan, but in the Philippines, Nepal and Thailand, and published notes relating to each of these countries, as well as guiding a catalogue of non-passerine material in the Raffles Museum, Singapore.

Morioka-sensei joined the Ornithological Society of Japan in 1948 and was a member until his death, serving on its Council in 1971–2001, as Vice President in 1975–79 and President in 1991–93. He also assumed the important role of editor of *Tori* in 1979–90 and again in 1993–98.

He was recruited to join the Standing Committee on Ornithological Nomenclature (of the International Ornithological Committee) in 1986 and served until 2012, staunchly supporting stability of names in nomenclature. Many of his publications were in Japanese, but he was a main editor of the fifth (1974) and sixth (2000) editions of the *Checklist of Japanese birds*, published by the Ornithological Society of Japan. In 2005, with colleagues, he also published a monograph on types of Japanese birds both in and outside Japan, including both extant and lost specimens. Gentle and courteous, he will be much missed by all who had the pleasure and privilege of working with him.

Walter J. Bock, Edward C. Dickinson, Isao Nishiumi and Richard Schodde

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The avifauna of El Angolo Hunting Reserve, north-west Peru: natural history notes

by Javier Barrio, Diego García-Olaechea & Alexander More

Received 10 December 2012; final revision accepted 17 January 2015

SUMMARY.—The Tumbesian Endemic Bird Area (EBA) extends from north-west Ecuador to western Peru and supports many restricted-range bird species. The most important protected area in the region is the Northwest Biosphere Reserve in Peru, which includes El Angolo Hunting Reserve (AHR). We visited AHR many times between 1990 and 2012. Among bird species recorded were 41 endemic to the Tumbesian EBA and six endemic subspecies that may merit species status, while 11 are threatened and eight are Near Threatened. We present ecological or distributional data for 29 species.

The Tumbesian region Endemic Bird Area (EBA) extends from Esmeraldas province, in north-west Ecuador, south to northern Lima, on the central Peruvian coast (Stattersfield *et al.* 1998). It covers *c.*130,000 km² and supports one of the highest totals of restricted-range bird species: 55 according to Stattersfield *et al.* (1998), or 56 following Best & Kessler (1995), the third largest number of endemic birds at any EBA globally.

Within the EBA, in extreme north-west Peru, the Northwest Biosphere Reserve (NWBR) covers more than *c.*200,000 ha, with at least 96% forest cover (*cf.* Fig 38 in Best & Kessler 1995: 113, where all solid black on the left forms part of the NWBR). This statement is still valid today (Google Earth). The NWBR covers the Cerros de Amotape massif, a 130 km-long cordillera, 25–30 km wide at elevations of 250–1,600 m, running parallel to the main Andean chain (Palacios 1994). It includes from north to south, Tumbes National Reserve (19,267 ha), Cerros de Amotape National Park (151,561 ha) and El Angolo Hunting Reserve (65,000 ha). Within NWBR, most ornithological research has been conducted in humid forest of the former ‘Tumbes Reserved Zone’ (now part of Cerros de Amotape National Park), e.g. Schulenberg & Parker (1981), Wiedenfeld *et al.* (1985) and Parker *et al.* (1995). However, more attention has been devoted to Tumbesian Ecuador (Best & Kessler 1995). El Angolo Hunting Reserve (AHR) comprises the southern part of NWBR.

Methods

AHR (Fig. 1) was visited as follows by the authors. (1) South-east, the main area studied, centred at the Sauce Grande lodge, at *c.*04°22'S, 80°44'W, at an elevation of 670 m. Most observations were within 10 km of the lodge, at 500–800 m, including Barbacobas, El Angolo, Sauce Grande and Barranco Colorado creeks; (2) South Cordillera, including the area known as Cerro El Viento, at *c.*04°22'S, 80°48'W, at 800–1,300 m; (3) East, centred on 04°17'S, 80°40'W, including El Venado, and Las Taloneras and Overal creeks, at 500–1,100 m; (4) Central, centred on Los Antiguos (04°18'S, 80°46'W), at 700–1,000 m; (5) North-west, centred on 04°13'S, 80°51'W, at 130–600 m, including Fernandez and Caña Dulce creeks, Pilares de Fernandez and Cabuyal; and (6) North Cordillera, the highest part of AHR, at *c.*04°14'S, 80°41'W, including Cherrelisque, La Falda and Cerro Carrizal, at 900–1,600 m.

JB undertook week-long bird surveys in the Southeast and South Cordillera sectors in August 1990, August 1992, August 1994, December 1999, August 2001 and February 2004 (the last survey with F. Angulo). Additionally, JB spent >200 days in the same sectors in



Figure 1. Location of El Angolo and our study areas (see also main text). (1) South-east, the main area studied, includes Barbacobas, El Angolo, Saucedo Grande and Barranco Colorado creeks, 500–800 m; (2) South Cordillera, including Cerro El Viento, 800–1,300 m; (3) East, includes El Venado, and Las Taloneras and Overall creeks, 500–1,100 m; (4) Central, centred on Los Antiguos, 700–1,000 m; (5) North-west, includes Fernandez and Caña Dulce creeks, Pilares de Fernandez and Cabuyal, 130–600 m; and (6) North Cordillera, includes Cherrelisque, La Falda and Cerro Carrizal, 900–1,600 m.

October 1994–October 1995, including the wet season, on 11 February–4 March 1995 and 19 March–4 April 1995. Although bird recording was a secondary activity, wherever possible JB documented records with photographs and sound-recordings. JB conducted mist-netting in the South-east sector in August 1992, August 1994 and April 1995, and in the South Cordillera in April 1995 and December 1999. DG-O intensively surveyed La Falda in the North Cordillera, El Venado in the East sector and Los Antiguos in the Central sector in June–July 2006, October–November 2006 and June 2007, for *c.*15 days each time, including mist-netting and playback. JB spent three days at Fernandez and Caña Dulce creeks in the North-west sector in February 2009. AM visited both Pilares de Fernandez and Cabuyal in the North-west sector and Cherrelisque in the North Cordillera for two days each in June 2009. AM surveyed Cerro Carrizal in the North Cordillera during three-day visits in August 2009 and December 2011, including mist-netting. AM also visited Overall creek, in the East Sector in November–December 2010, October 2011 and May 2012. Furthermore, in the South-east and South Cordillera, T. Valqui made observations, mist-netting and sound-recording in the wet season of March 1993, as well as annual observations since 2000 under the auspices of the Conservation Data Center (CDC – La Molina). F. Angulo helped identify vocalisations from sound-recordings and raptors from photographs. M. Castagnola recorded raptors and collected a pair of siskins *Sporagra* in 1997.

Habitat.—The altitudinal range of AHR is 130–1,600 m, from low hills to steep-sided mountains. Precipitation varies markedly between years. Considering data from 1995 to 2006, annual precipitation at Saucedo Grande, in the south-east sector, fluctuated from *c.*100 mm in very dry years to considerably more than 3,000 mm in El Niño years (Vásquez *et al.* 2007). The dry season typically occupies May–December, and the wet season January–April. With rare exceptions, all rainfall occurs during the latter. Consequently, Tumbesian dry forest exhibits strong seasonality. The wet season promotes the growth of annual herbaceous plants, and a different floral composition to the dry season. Considering only permanent trees and shrubs, the dominant species are as follows. At *c.*130–600 m trees

include *Prosopis pallida*, *Loxopterigium huasango*, *Capparis scabrida* and *Caesalpinia paipai*, the first of which is dominant below 400 m, with some shrubs, e.g. *Ipomoea carnea* and *Cordia lutea*, and cacti, e.g. *Cereus difusus* and *Neoraimondia arequipensis* var. *gigantea*. (Sabogal & Zerbe 2005, Vásquez *et al.* 2007). At c.600 m, dominant trees are *Cochlospermum vitifolium*, *Bursera graveolens* and *Erythrina smithiana*. Scrub composition includes *Mimosa myriadena*, *M. acantholoba* and *Byttneria glabrescens*. Above 700–750 m, on the lower slopes of mountains, the most conspicuous trees are *Eriotheca ruizii*, *Ceiba trichistranda*, *Geoffroea striata* and *Terminalia valverdae*. Both *E. ruizii* and *C. trichistranda* are usually covered by *Tillandsia usneoides* or other *Tillandsia* spp. epiphytes. Riparian areas (600–900 m) also host *Ficus padifolia*, *Styrax tarapotensis*, *Celtis iguanea*, *Cestrum auriculatum*, *Acnistus arborescens*, *Muntingia calabura* and *Acacia macracantha* (Angulo & Barrio 2004). In higher and more humid areas, usually above 800 m, dominant trees are *Myrcianthes discolor*, *Styrax tarapotensis*, *Psidium guajaba*, *Capparis prisca* and *Fulcaldea laurifolia*. Trees and shrubs above 1,400 m are usually covered in lichens and mosses. Although no people live within AHR, the area is seasonally used for cattle grazing (especially in the dry season).

Results

The surveys produced 196 species (Table 1). Of these, 41 are Tumbesian endemics, following Remsen *et al.* (2015), or 47, based on Ridgely & Greenfield (2001). In either case, we used Best & Kessler (1995) to determine if the taxon is endemic to the Tumbesian EBA. Following IUCN (2014), the list includes five Endangered (EN), six Vulnerable (VU) and eight Near Threatened species (NT). The following accounts report interesting distributional or ecological data collected during the study.

PALE-BROWED TINAMOU *Crypturellus transfasciatus* NT

Endemic to the Tumbesian EBA. Uncommon in 1994–95, February 2004 and in the 2006 surveys; however, in December 1999 and August 2001 it was common, being seen and heard daily. The population might fluctuate following rain cycles, but confirmation is required. Usually found along creeks and slopes of montane areas—where it is more numerous than Andean Tinamou *Nothoprocta pentlandii*—but it is not rare lower down. All observations were made above 600 m and within, or close to, dense undergrowth. A male was seen by JB with three small chicks on 23 March 1995. Chicks mostly brown with few markings; crown also brown, but paler, with four stripes on crown-sides, black/dark, brown, black/dark and a creamy/whitish supercilium that extended to the forehead. The black/dark lores extended as an eyestripe, with a black/dark spot on each wing. Marchant (1960) reported eggs in early May in Ecuador.

ANDEAN TINAMOU *Nothoprocta pentlandii*

Juveniles observed with single adults in April–May 1995, in which year the species had a moderate density in the area (Barrio 2004). However, it was hard to find in August 2001, during a week-long survey when Pale-browed Tinamou was recorded daily, and in February 2004, when Pale-browed Tinamou was also uncommon.

RUFOUS-HEADED CHACHALACA *Ortalis erythroptera* VU

Endemic to the Tumbesian EBA. First recorded in October 1994 (Barrio & Begazo 1998). It is apparently very local in higher areas, usually above 1,000 m, where it is uncommon. We have observed it in groups of 1–5. There appears to be several subpopulations in AHR. In the South Cordillera, it occurs at 900–1,150 m, near some permanent small springs. In the North Cordillera, DG-O heard several groups daily at higher altitudes. In the East sector,

TABLE 1

List of bird species recorded in El Angolo Hunting Reserve, Tumbes, north-west Peru. Nomenclature largely follows Remsen *et al.* (2015). IUCN threat status: NT = Near Threatened; VU = Vulnerable; EN = Endangered. Endemic / migrant: E = species endemic to Tumbesian EBA; e = subspecies endemic to Tumbesian EBA; Mn = migrant from North America; Mloc = migrant from nearby areas. Abundance: C = common; F = fairly common; U = uncommon; O = occasional; R = rare; m = boreal migrant; sm = austral migrant; r = most conspicuous in wet season; d = most conspicuous in dry season; l = local, otherwise less abundant. Strata: A = air; G = ground; S = shrubs; T = trees. Habitat: O = open lowlands; H = hills; C = creeks; M = mountains (including creeks); E = throughout; O-C = broad creeks in lowlands. Photo: AM = Alexander More; CDC = Conservation Data Center / Pedro Vásquez; DG = Diego García; JB = Javier Barrio; # = others. Sound-recorded: JB = Javier Barrio; W/M = Whiffin & More (2003) expedition; # = recordings mentioned in other publications.

| Scientific name | English name | IUCN threat status | Endemic / migrant | Abundance | Strata | Habitat | Photo | Sound-recorded |
|---------------------------------------|---------------------------|--------------------|-------------------|-----------|--------|---------|---------|----------------|
| TINAMIDAE | | | | | | | | |
| <i>Crypturellus transfasciatus</i> | Pale-browed Tinamou | NT | E | F | G | MH | JB | JB |
| <i>Nothoprocta pentlandii ambigua</i> | Andean Tinamou | | | F | G | E | JB, AM | |
| ANATIDAE | | | | | | | | |
| <i>Sarkidiornis melanotos</i> | Comb Duck | | | R | G | O | AM | |
| CRACIDAE | | | | | | | | |
| <i>Ortalis erythroptera</i> | Rufous-headed Chachalaca | VU | E | U | ST | M | JB | |
| CICONIIDAE | | | | | | | | |
| <i>Jabiru mycteria</i> | Jabiru | | | O | GS | O | CDC | |
| <i>Mycteria americana</i> | Wood Stork | | | R | S | O-C | AM | |
| FREGATIDAE | | | | | | | | |
| <i>Fregata magnificens</i> | Magnificent Frigatebird | | | O | A | O | | |
| PHALACROCORACIDAE | | | | | | | | |
| <i>Phalacrocorax brasilianus</i> | Neotropic Cormorant | | | U | TA | C | | |
| ARDEIDAE | | | | | | | | |
| <i>Nycticorax nycticorax</i> | Black-crowned Night Heron | | | Or | GS | CO | CDC | |
| <i>Butorides striata</i> | Striated Heron | | | U | S | O-C | | |
| <i>Bubulcus ibis</i> | Cattle Egret | | | R | G | CO | JB | |
| <i>Ardea cocoi</i> | Cocoi Heron | | | O | TG | CO | JB | |
| <i>Ardea alba</i> | Great Egret | | | O | G | CO | # | |
| <i>Egretta thula</i> | Snowy Egret | | | U | G | CO | CDC | |
| CATHARTIDAE | | | | | | | | |
| <i>Cathartes aura</i> | Turkey Vulture | | | C | AT | E | JB, AM | |
| <i>Coragyps atratus</i> | Black Vulture | | | C | AT | E | CDC, AM | |
| <i>Sarcoramphus papa</i> | King Vulture | | | F | A | MH | JB, AM | |
| <i>Vultur gryphus</i> | Andean Condor | NT | | R | A | M | | |
| PANDIONIDAE | | | | | | | | |
| <i>Pandion haliaetus</i> | Osprey | | | O | A | O | JB | |
| ACCIPITRIDAE | | | | | | | | |
| <i>Gampsonyx swainsonii</i> | Pearl Kite | | | U | T | O | JB, AM | |
| <i>Accipiter bicolor</i> | Bicoloured Hawk | | | U | T | C | JB, AM | |
| <i>Geranospiza caerulescens</i> | Crane Hawk | | | R | T | HC | JB, AM | |
| <i>Buteogallus urubitinga</i> | Great Black Hawk | | | R | TA | HC | | |

| Scientific name | English name | IUCN threat status | Endemic / migrant | Abundance | Strata | Habitat | Photo | Sound-recorded |
|----------------------------------|-----------------------------|--------------------|-------------------|-----------|--------|---------|---------|----------------|
| <i>Buteogallus solitarius</i> | Solitary Eagle | NT | | U | TA | HC | JB | |
| <i>Geranoaetus polyosoma</i> | Red-backed Hawk | | | R | AT | M | AM | |
| <i>Geranoaetus melanoleucus</i> | Black-chested Buzzard-Eagle | | | R | A | M | | |
| <i>Parabuteo unicinctus</i> | Harris's Hawk | | | UF | A | MH | JB, AM | |
| <i>Buteo brachyurus</i> | Short-tailed Hawk | | | R | A | H | | |
| <i>Buteo albonotatus</i> | Zone-tailed Hawk | | | R | A | M | CDC | |
| CHARADRIIDAE | | | | | | | | |
| <i>Oreopholus ruficollis</i> | Tawny-throated Dotterel | | | R | G | O | | |
| <i>Charadrius vociferus</i> | Killdeer | | | Cl | G | O | CDC, AM | |
| RECURVIROSTRIDAE | | | | | | | | |
| <i>Himantopus mexicanus</i> | Black-necked Stilt | | | U | G | O-C | CDC | |
| BURHINIDAE | | | | | | | | |
| <i>Burhinus superciliaris</i> | Peruvian Thick-knee | | | U-Fr | G | O | CDC | |
| SCOLOPACIDAE | | | | | | | | |
| <i>Calidris minutilla</i> | Least Sandpiper | | Mn | Urm | G | O-C | | |
| <i>Calidris bairdii</i> | Baird's Sandpiper | | Mn | Urm | G | O-C | | |
| <i>Actitis macularius</i> | Spotted Sandpiper | | | Fr | G | C | | |
| <i>Tringa melanoleuca</i> | Greater Yellowlegs | | | Fr | G | C | | |
| <i>Tringa flavipes</i> | Lesser Yellowlegs | | | Fr | G | C | | |
| COLUMBIDAE | | | | | | | | |
| <i>Leptotila verreauxi</i> | White-tipped Dove | | | C | G | E | JB | JB |
| <i>Leptotila ochraceiventris</i> | Ochre-bellied Dove | VU | E | R | S | C | | |
| <i>Zenaida meloda</i> | West Peruvian Dove | | | U | T | O | CDC | |
| <i>Columbina buckleyi</i> | Ecuadorian Ground Dove | | E | U-Cr | SG | H | CDC | |
| <i>Zenaida auriculata</i> | Eared Dove | | | C | T | E | CDC | |
| <i>Columbina cruziana</i> | Croaking Ground Dove | | | C | G | E | JB, AM | |
| <i>Claravis pretiosa</i> | Blue Ground Dove | | | Rr | G | H | | |
| CUCULIDAE | | | | | | | | |
| <i>Piaya cayana</i> | Squirrel Cuckoo | | Mn | Rm | S | M | | |
| <i>Coccyzus erythrophthalmus</i> | Black-billed Cuckoo | | Mn | Urm | S | HM | | |
| <i>Coccyzus lansbergi</i> | Grey-capped Cuckoo | | Mloc | Rr | S | H | | |
| <i>Crotophaga sulcirostris</i> | Groove-billed Ani | | | F | S | H | CDC | # |
| <i>Tapera naevia</i> | Striped Cuckoo | | | U | GS | M | | |
| TYTONIDAE | | | | | | | | |
| <i>Tyto alba</i> | Barn Owl | | | R | T | HM | | |
| STRIGIDAE | | | | | | | | |
| <i>Megascops roboratus</i> | Peruvian Screech Owl | | | U | T | HM | JB | JB |
| <i>Pulsatrix perspicillata</i> | Spectacled Owl | | | U | T | H | | |
| <i>Bubo virginianus</i> | Great Horned Owl | | | R | T | E | | |
| <i>Glaucidium peruanum</i> | Peruvian Pygmy Owl | | | F | T | C | JB, AM | JB |
| <i>Athene cucularia</i> | Burrowing Owl | | | U | G | OH | | |
| <i>Pseudoscops clamator</i> | Striped Owl | | | O | T | OH | CDC | |
| NYCTIBIIDAE | | | | | | | | |
| <i>Nyctibius griseus</i> | Common Potoo | | | U | T | E | CDC | # |

| Scientific name | English name | IUCN threat status | Endemic / migrant | Abundance | Strata | Habitat | Photo | Sound-recorded |
|--|------------------------------|--------------------|-------------------|-----------|--------|---------|---------|----------------|
| CAPRIMULGIDAE | | | | | | | | |
| <i>Chordeiles acutipennis</i> | Lesser Nighthawk | | | U | ST | HM | | |
| <i>Nyctidromus albicollis</i> | Common Pauraque | | | C | G | E | | |
| <i>Nyctidromus anthonyi</i> | Scrub Nightjar | | E | U | G | HC | CDC | JB |
| APODIDAE | | | | | | | | |
| <i>Streptoprocne zonaris</i> | White-collared Swift | | Mloc | R | A | MH | | |
| <i>Chaetura pelagica</i> | Chimney Swift | | | Rm | A | MH | | |
| <i>Chaetura brachyura ocybetes</i> | Short-tailed (Tumbes) Swift | | e | C | A | H | | JB |
| <i>Panyptila cayennensis</i> | Lesser Swallow-tailed Swift | | | R | A | M | | |
| TROCHILIDAE | | | | | | | | |
| <i>Phaetornis griseogularis porcellae</i> | Grey-chinned Hermit | | | Ul | S | H | # | |
| <i>Phaetornis longirostris baroni</i> | Long-billed (Baron's) Hermit | | e | Rl | S | H | | |
| <i>Heliomaster longirostris</i> | Long-billed Starthroat | | | U | TS | CH | JB | |
| <i>Myrtis fanny</i> | Purple-collared Woodstar | | | R | S | C | JB | |
| <i>Thaumastura cora</i> | Peruvian Sheartail | | | R | S | OC | | |
| <i>Myrmia micrura</i> | Short-tailed Woodstar | | E | F | S | E | JB | # |
| <i>Leucippus baeri</i> | Tumbes Hummingbird | | E | C | ST | E | JB, AM | # |
| <i>Amazilia amazilia leucophaea</i> | Amazilia Hummingbird | | | C | ST | E | JB | JB |
| TROGONIDAE | | | | | | | | |
| <i>Trogon mesurus</i> | Ecuadorian Trogon | | E | R | S | C | AM | |
| ALCEDINIDAE | | | | | | | | |
| <i>Megaceryle torquata</i> | Ringed Kingfisher | | | U | T | C | AM | |
| <i>Chloroceryle americana</i> | Green Kingfisher | | | U | S | C | JB, AM | |
| MOMOTIDAE | | | | | | | | |
| <i>Momotus subrufescens argenticinctus</i> | Whooping Motmot | | | U | S | C | JB, AM | # |
| PICIDAE | | | | | | | | |
| <i>Picumnus sclateri</i> | Ecuadorian Piculet | | E | C | S | E | JB, AM | # |
| <i>Veniliornis callonotus</i> | Scarlet-backed Woodpecker | | | C | T | E | JB, AM | JB |
| <i>Colaptes rubiginosus rubripileus</i> | Golden-olive Woodpecker | | | U | T | E | JB, AM | # |
| <i>Dryocopus lineatus fuscipennis</i> | Lineated Woodpecker | | | R | T | E | CDC, AM | |
| <i>Campephilus gayaquilensis</i> | Guayaquil Woodpecker | NT | | U | T | E | JB | # |
| FALCONIDAE | | | | | | | | |
| <i>Herpetotheres cachinnans</i> | Laughing Falcon | | | C | T | MH | JB, AM | JB |
| <i>Micrastur semitorquatus</i> | Collared Forest Falcon | | | R | T | C | | |
| <i>Caracara cheriway</i> | Crested Caracara | | | U | GA | HO | JB, AM | |
| <i>Falco sparverius</i> | American Kestrel | | | U | AT | OH | CDC, AM | JB |
| <i>Falco columbarius</i> | Merlin | | | R | AT | HO | | |
| <i>Falco rufifigularis</i> | Bat Falcon | | | R | S | C | # | |
| <i>Falco femoralis</i> | Aplomado Falcon | | | R | A | HM | CDC | |
| <i>Falco peregrinus</i> | Peregrine Falcon | | Mn? | Um | A | E | | |
| PSITTACIDAE | | | | | | | | |
| <i>Brotogeris pyrrhoptera</i> | Grey-cheeked Parakeet | EN | E | Rr | T | M | | |
| <i>Forpus coelestis</i> | Pacific Parrotlet | | E | C | SA | E | JB, AM | JB |

| Scientific name | English name | IUCN threat status | Endemic / migrant | Abundance | Strata | Habitat | Photo | Sound-recorded |
|---|---------------------------------------|--------------------|-------------------|-----------|--------|---------|--------|----------------|
| <i>Psittacara erythrogenys</i> | Red-masked Parakeet | NT | E | C | TA | E | JB, AM | JB |
| THAMNOPHILIDAE | | | | | | | | |
| <i>Thamnophilus bernardi</i> | Collared Antshrike | | E | C | S | E | JB, AM | JB |
| MELANOPAREIIDAE | | | | | | | | |
| <i>Melanopareia elegans</i> | Elegant Crescentchest | | E | C | G | MH | JB, AM | JB |
| GRALLARIDAE | | | | | | | | |
| <i>Grallaria watkinsi</i> | Scrub Antpitta | | E | F | G | M | | JB |
| FURNARIIDAE | | | | | | | | |
| <i>Sittasomus griseicapillus</i> | Olivaceous Woodcreeper | | | UR | T | C | # | |
| <i>Campylorhamphus trochilrostris</i> | Red-billed Scythebill | | | R | T | C | JB | |
| <i>Lepidocolaptes souleyetii</i> | Streak-headed Woodcreeper | | | C | T | E | JB, AM | JB |
| <i>Furnarius leucopus cinnamomeus</i> | Pale-legged (Pacific) Hornero | | e | C | G | C | JB, AM | JB |
| <i>Syndactyla ruficollis</i> | Rufous-necked Foliage-gleaner | VU | E | Cr | S | C | | |
| <i>Clibanornis erythrocephalus</i> | Henna-hooded Foliage-gleaner | VU | E | U | S | C | DG, AM | |
| <i>Cranioleuca antisiensis</i> | Line-cheeked Spinetail | | | U | S | M | JB | |
| <i>Synallaxis stictothorax</i> | Necklaced Spinetail | | E | U | S | O | | |
| <i>Synallaxis tithys</i> | Blackish-headed Spinetail | EN | E | R | S | M | DG, AM | |
| TYRANNIDAE | | | | | | | | |
| <i>Myiopagis subplacens</i> | Pacific Elaenia | | E | F | T | M | JB | JB |
| <i>Elaenia flavogaster</i> | Yellow-bellied Elaenia | | | C | S | MH | | |
| <i>Campostoma obsoletum</i> | Southern Beardless Tyrannulet | | | C | ST | E | JB | JB |
| <i>Mecocerculus calopterus</i> | Rufous-winged Tyrannulet | | | F | TS | M | # | |
| <i>Phaeomyias murina tumbesana</i> | Mouse-coloured (Tumbesian) Tyrannulet | | e | F | S | MH | | |
| <i>Euscarthmus meloryphus</i> | Tawny-crowned Pygmy Tyrant | | | C | S | E | JB | JB |
| <i>Pseudelaenia leucospodia</i> | Grey-and-white Tyrannulet | | | C | S | OH | JB, AM | JB |
| <i>Todirostrum cinereum sclateri</i> | Common Tody-Flycatcher | | | C | T | C | JB | JB |
| <i>Tolmomyias sulphurescens</i> | Yellow-olive Flycatcher | | | U | T | C | JB | |
| <i>Myiophobus fasciatus crypterythrus</i> | Bran-coloured Flycatcher | | | F | TS | MH | JB | JB |
| <i>Lathrotriccus griseipectus</i> | Grey-breasted Flycatcher | VU | E | R | TS | C | JB, AM | |
| <i>Contopus cooperi</i> | Olive-sided Flycatcher | NT | Mn | Rm | T | H | JB | |
| <i>Contopus fumigatus</i> | Greater Pewee | | | U | T | C | JB | |
| <i>Contopus sordidulus</i> | Western Wood Pewee | | Mn | Cr | S | CH | | |
| <i>Contopus cinereus punensis</i> | Tropical (Tumbes) Pewee | | e | C | S | E | JB | # |
| <i>Sayornis nigricans</i> | Black Phoebe | | | R/U | G | C | | |
| <i>Pyrocephalus rubinus</i> | Vermilion Flycatcher | | | C | S | E | JB, AM | # |
| <i>Tumbezia salvini</i> | Tumbes Tyrant | NT | E | U | S | MH | JB, AM | JB |
| <i>Muscigralla brevicauda</i> | Short-tailed Field Tyrant | | | U | G | OH | JB | |
| <i>Myiodynastes bairdii</i> | Baird's Flycatcher | | E | C | T | E | JB | JB |
| <i>Myiodynastes maculatus</i> | Streaked Flycatcher | | | Ur | T | C | AM | # |
| <i>Megarynchus pitangua</i> | Boat-billed Flycatcher | | | U | T | C | | |
| <i>Tyrannus niveigularis</i> | Snowy-throated Kingbird | | | Cr | T | MH | # | |
| <i>Tyrannus melancholicus</i> | Tropical Kingbird | | | R | T | C | | |
| <i>Myiarchus semirufus</i> | Rufous Flycatcher | EN | E | U | ST | OC | | |

| Scientific name | English name | IUCN threat status | Endemic / migrant | Abundance | Strata | Habitat | Photo | Sound-recorded |
|---|-------------------------------|--------------------|-------------------|-----------|--------|---------|--------|----------------|
| <i>Myiarchus tuberculifer</i> | Dusky-capped Flycatcher | | | U | ST | M | | |
| <i>Myiarchus phaeocephalus</i> | Sooty-crowned Flycatcher | | E | C | T | MH | | JB |
| COTINGIDAE | | | | | | | | |
| <i>Phytotoma raimondii</i> | Peruvian Plantcutter | EN | E | R | S | O | | # |
| TITYRIDAE | | | | | | | | |
| <i>Pachyramphus spodiurus</i> | Slaty Becard | EN | E | R | S | C | # | |
| <i>Pachyramphus albogriseus</i> | Black-and-white Becard | | | F | S | C | | |
| <i>Pachyramphus homochrous</i> | One-coloured Becard | | | R | S | C | AM | |
| VIREONIDAE | | | | | | | | |
| <i>Cyclarhis gujanensis</i> | Rufous-browed Peppershrike | | | U | TS | C | # | JB |
| <i>Vireo leucophrys</i> | Brown-capped Vireo | | | ? | ST | M | | W/M |
| <i>Vireo olivaceus</i> | Red-eyed Vireo | | | Ur | T | CM | JB | JB |
| CORVIDAE | | | | | | | | |
| <i>Cyanocorax mystacalis</i> | White-tailed Jay | | E | C | ST | E | JB, AM | JB |
| HIRUNDINIDAE | | | | | | | | |
| <i>Pygochelidon cyanoleuca</i> | Blue-and-white Swallow | | | U | A | OH | | |
| <i>Stelgidopteryx ruficollis</i> | Southern Rough-winged Swallow | | | U | A | OH | | |
| <i>Progne tapera</i> | Brown-chested Martin | | | C | A | H | JB | |
| <i>Progne chalybea</i> | Grey-breasted Martin | | | U | A | ? | | |
| <i>Tachycineta stolzmanni</i> | Tumbes Swallow | | E | Cl | A | O | | |
| <i>Petrochelidon rufocollaris</i> | Chestnut-collared Swallow | | | U | A | H | | |
| TROGLODYTIDAE | | | | | | | | |
| <i>Troglodytes aedon</i> | House Wren | | | C | G | HM | JB | JB |
| <i>Campylorhynchus fasciatus</i> | Fasciated Wren | | | C | T | E | JB | JB |
| <i>Pheugopedius sclateri paucimaculatus</i> | Speckle-breasted Wren | | e | U | S | M | # | W/M |
| <i>Cantorchilus superciliosus</i> | Superciliated Wren | | E | C | SG | MH | JB, AM | JB |
| POLIOPTILIDAE | | | | | | | | |
| <i>Polioptila plumbea bilineata</i> | Tropical Gnatcatcher | | | C | ST | E | JB | JB |
| TURDIDAE | | | | | | | | |
| <i>Catharus ustulatus</i> | Swainson's Thrush | | M | Um | ST | M | # | |
| <i>Turdus reevei</i> | Plumbeous-backed Thrush | | E | C | T | C | JB, AM | # |
| MIMIDAE | | | | | | | | |
| <i>Mimus longicaudatus</i> | Long-tailed Mockingbird | | | C | S | E | JB, AM | JB |
| THRAUPIDAE | | | | | | | | |
| <i>Conothraupis speculigera</i> | Black-and-white Tanager | NT | Mloc | Cr | S | MH | JB, AM | JB |
| <i>Thraupis episcopus</i> | Blue-grey Tanager | | | F | T | C | JB | |
| <i>Phrygilus plebejus</i> | Ash-breasted Sierra Finch | | | C | G | E | | |
| <i>Phrygilus alaudinus</i> | Band-tailed Sierra Finch | | | R | SG | H | | |
| <i>Poospiza hispaniolensis</i> | Collared Warbling Finch | | | C | GS | C | # | |
| <i>Sicalis flaveola</i> | Saffron Finch | | | C | T | O | AM | |
| <i>Sicalis taczanowskii</i> | Sulphur-throated Finch | | E | U | GS | OH | AM | |
| <i>Volatinia jacarina</i> | Blue-black Grassquit | | | F | S | CH | JB | |
| <i>Sporophila peruviana</i> | Parrot-billed Seedeater | | | C | SG | OH | CDC | |

| Scientific name | English name | IUCN threat status | Endemic / migrant | Abundance | Strata | Habitat | Photo | Sound-recorded |
|--|-----------------------------------|--------------------|-------------------|-----------|--------|---------|---------|----------------|
| <i>Sporophila telasco</i> | Chestnut-throated Seedeater | | | Ur | S | C | | |
| <i>Sporophila simplex</i> | Drab Seedeater | | | U | S | CH | | |
| <i>Sporophila corvina</i> | Variable Seedeater | | | R | S | C | | |
| <i>Sporophila luctuosa</i> | Black-and-white Seedeater | | | Rr | S | C | # | |
| <i>Rhodospingus cruentus</i> | Crimson-breasted Finch | E | | R | T | C | JB | |
| <i>Coereba flaveola</i> | Bananaquit | | | C | T | C | JB | |
| INCERTAE SEDIS | | | | | | | | |
| <i>Saltator striatipectus flavidicollis</i> | Streaked Saltator | | | U | ST | C | JB, AM | |
| EMBERIZIDAE | | | | | | | | |
| <i>Zonotrichia capensis</i> | Rufous-collared Sparrow | | | R | SG | H | | |
| <i>Rynchospiza stolzmanni</i> | Tumbes Sparrow | E | | C | GS | E | JB, AM | JB |
| <i>Arremon aurantirostris</i> | Orange-billed Sparrow | | | R | ST | M | | W/M |
| <i>Arremon abeillei</i> | Black-capped Sparrow | E | | C | G | C | JB | |
| <i>Atlapetes leucopterus</i> | White-winged Brush Finch | | | C | S | MH | JB | # |
| <i>Atlapetes albiceps</i> | White-headed Brush Finch | E | | C | GS | MH | JB, AM | # |
| <i>Atlapetes seebohmi</i> | Bay-crowned Brush Finch | E | | F | S | M | DG | |
| CARDINALIDAE | | | | | | | | |
| <i>Piranga flava lutea</i> | (Highland) Hepatic Tanager | | | C | T | C | JB, AM | |
| <i>Piranga rubra</i> | Summer Tanager | | | Fm | T | M | # | W/M |
| <i>Piranga olivacea</i> | Scarlet Tanager | | | Rm | T | M | | W/M |
| <i>Phœucticus chrysogaster</i> | Golden-bellied Grosbeak | | | F | ST | C | AM | JB |
| PARULIDAE | | | | | | | | |
| <i>Geothlypis aequinoctialis auricularis</i> | Masked (Black-lored) Yellowthroat | | | U | ST | C | JB | |
| <i>Setophaga pitiayumi</i> | Tropical Parula | | | C | T | M | JB | JB |
| <i>Myiothlypis fraseri</i> | Grey-and-gold Warbler | E | | R | ST | C | # | |
| <i>Basileuterus trifasciatus</i> | Three-banded Warbler | E | | R | ST | C | | |
| ICTERIDAE | | | | | | | | |
| <i>Cacicus cela</i> | Yellow-rumped Cacique | | | U | T | C | CDC, AM | JB |
| <i>Icterus graceannae</i> | White-edged Oriole | E | | C | ST | E | JB | JB |
| <i>Icterus mesomelas</i> | Yellow-tailed Oriole | | | R | ST | C | | |
| <i>Dives warszewiczi</i> | Scrub Blackbird | | | U | S | HC | | |
| <i>Molothrus bonariensis</i> | Shiny Cowbird | | | Cr | ST | E | | |
| <i>Sturnella bellicosa</i> | Peruvian Meadowlark | | | Cr-Ud | F | O | JB, AM | JB |
| FRINGILLIDAE | | | | | | | | |
| <i>Sporagra magellanica</i> | Hooded Siskin | | | C | SG | O | AM | |
| <i>Sporagra siemiradzki</i> | Saffron Siskin | VU | E | U | S | C | ?JB | |
| <i>Astragalinus psaltria</i> | Lesser Goldfinch | | | R | ST | M | | W/M |
| <i>Euphonia saturata</i> | Orange-crowned Euphonia | | | R | T | C | | |
| <i>Euphonia lanirostris</i> | Thick-billed Euphonia | | | C | T | M | JB | JB |

AM saw five at El Golpe and one at El Polo in October 2011, above 1,000 m. All were in shrubs 1.5–3 m above ground. Two were photographed, one in 1995 by JB, another in 2004 by F. Angulo.

ANDEAN CONDOR *Vultur gryphus* NT

Regularly observed in the higher mountains, but only two sightings during seven visits to the South Cordillera in 1994, 1995 and 1999: JB observed an adult on 6 June 1995 and an immature on 13 September 1995. On July 2006, DG-O observed a pair of adults, together with a pair of King Vultures *Sarcoramphus papa*. Formerly more common, based on comments by local people living near the area. However, up to ten were seen in November 2011 at the base of Cerro El Viento (South Cordillera) by students from the Universidad Nacional Agraria La Molina. It is possible that the species still breeds on remote rocky outcrops.

BICOLOURED HAWK *Accipiter bicolor*

Observed at most sites at higher elevations. M. Castagnola mist-netted and released an adult female in August 1997 in the South-east sector. In December 1994, an immature was observed pursuing a group of White-tailed Jays *Cyanocorax mystacalis*, and two hours later what appeared to be the same bird chased some Croaking Ground Doves *Columbina cruziana*, Long-tailed Mockingbirds *Mimus longicaudatus* and a White-edged Oriole *Icterus graceannae*. In August 1995 another immature was observed pursuing a Scrub Antpitta *Grallaria watkinsi*. In November 2006, an immature pursued a Pale-browed Tinamou. All observed hunting attempts failed. In separate sightings during 1995, an adult and an immature were seen with White-tipped Doves *Leptotila verreauxi* in their talons. Also, in November 2006 an immature was photographed carrying a Croaking Ground Dove.

SHORT-TAILED WOODSTAR *Myrmia micrura*

Endemic to the Tumbesian EBA. Less common than Tumbes *Leucippus baeri* and Amazilia Hummingbirds *Amazilia amazilia*, but commoner than other hummingbirds in the area. Both sexes were observed feeding on *Capparis scabrida* and *Cordia lutea* flowers, piercing them from the side; however, it also feeds from the top of *C. lutea* and smaller flowers. DG-O photographed a nest with two chicks in July 2006; it was 1 m above ground on a dry shrub. A female was observed by JB gleaning insects from thin twigs in June 1995, possibly associated with nesting activity and / or feeding young. In contrast, Marchant (1960) found nests mostly in March–May.

ECUADORIAN PICULET *Picumnus sclateri*

Endemic to the Tumbesian EBA. Commonest along creeks and lower montane slopes, but is also present in *Prosopis* / *Caesalpinia*-dominated forest and on ridgetops. JB observed a male excavating a nest in a *Caryocar* sp., almost 8 m above ground, on 22 May 1995. When found, the hole could accommodate over half the bird's body and by the first week of June the nest had two holes. In July 1995, another nest was 2.3 m above ground in a dead branch of a *Schrebera americana* tree. Five individuals were seen entering to roost (one male and four females / juveniles). The entrance was an oval measuring 2.4 × 2.8 cm and the cavity 16.5 cm deep. Nests have not been described previously, but dates accord with Winkler *et al.* (1995).

SCARLET-BACKED WOODPECKER *Veniliornis callonotus*

A dry forest and scrub specialist common throughout AHR and frequently joins mixed-species flocks. Family groups of up to five birds also common. JB found an active nest in a live *Geoffroea striata* tree along a permanent creek, which was observed for 11 days in early June 1995. It was sited 8 m above ground in part of the tree stripped of bark. In eight hours of observation, the two nestlings were fed 5–9 times per hour, and three times in the hour prior to roosting. Fifty-one feeding events were observed, 30 by the male and 21 by the female. Only the male was observed cleaning the nest, three times in eight hours. Food

largely comprised insect larvae, but some adult insects were noted. Young fledged in the last week of June. Another hole found in July 1995 was used only for roosting. It was 2.8 m above ground in an *Acacia macracantha*, had a round entrance 3 cm in diameter, and was 27 cm deep. At dusk, five birds were observed entering the hole, but only two the following afternoon. Winkler *et al.* (1995) knew of no breeding data, but Mischler (2012) mentioned a male with a brood patch and nest with fledged young in July, and juveniles or immatures in July–October in south-west Ecuador.

PACIFIC PARROTLET *Forpus coelestis*

Endemic to the Tumbesian and Marañón Valley EBAs. Common year-round throughout AHR, which is perhaps one of the species' strongholds, being protected from the pet trade. Mostly seen in pairs or monospecific flocks of up to *c.*100 birds, while small groups even join mixed flocks led by Fasciated Wrens *Campylorhynchus fasciatus*. In March–April 1995 the species nested throughout the reserve, with no apparent preference for cavity type, agreeing with Marchant (1960), including holes in trees and earth banks along creeks, and below the roof of the lodge in the South-east sector. Surprisingly, nesting activity was not recorded by Best *et al.* (1996).

RED-MASKED PARAKEET *Psittacara erythrogenys* NT

Endemic to the Tumbesian EBA. Common year-round. Uses abandoned large woodpecker holes for nesting, along creeks with permanent water, during the wet season, until April or early May. In March 1995, several nests were found in the South-east sector, some with eggs and one with four unfeathered chicks weighing 16–64 g. Nesting suspected as late as July 2006 in La Falda, North Cordillera, when a pair was seen daily at a hole in a *Ceiba trichistranda*. In the South-east sector, groups up to 40 performed daily movements south-east to north-west in the morning, returning in the afternoon, probably commuting to agricultural areas outside the reserve. Apparently roosts in the lowlands, outside AHR, when not breeding. During February 2009, JB observed a group of five taking reddish mud on the ground, on a road outside AHR, much like parrots at an Amazonian clay lick. During the dry season, it regularly feeds on *Erythrina smithiana* flowers throughout AHR. At the south-eastern limit of the reserve, one with an entirely red head and neck was photographed by F. Angulo in August 2009 and by AM in December 2010. The bird was part of a large flock and interacted normally with others. Many are caught in the eastern AHR in July–September for the illegal pet trade.

PALE-LEGGED HORNERO *Furnarius leucopus cinnamomeus*

Endemic subspecies to the Tumbesian and Marañón Valley EBAs (Best & Kessler 1995). Sometimes (e.g. Ridgely & Greenfield 2001) treated as a species (Pacific Hornero), given differences from allopatric Amazonian *F. l. tricolor*. *F. l. cinnamomeus* has whitish underparts, yellowish irides, body size 19–20 cm and mean weight *c.*50 g, versus pale brown underparts, brown irides, 17–18 cm, and *c.*42 g in the Amazonian subspecies (based on specimens in the CORBIDI collection, Lima). Very common in the area. Several seen catching fish in a shallow river, often by walking on stones (Barrio & Valqui 2005). Observed building nests in December 1994, feeding nestlings in February–April 1995, and feeding juveniles in April 1995.

HENNA-HOODED FOLIAGE-GLEANER *Clibanornis erythrocephalus* VU

Endemic to the Tumbesian EBA. Locally rare, JB saw one in the South Cordillera in December 1999, which flushed from the leaf litter in a dry creek, returning briefly to the

ground before flying off, at c.850 m. A second record in November 2006 involved a pair foraging on the ground at La Falda, North Cordillera. In the East and North Cordillera daily vocalisations from at least two were heard in June and August 2009. In the North Cordillera one was mist-netted twice near a creek.

LINE-CHEEKED SPINETAIL *Cranioleuca antisiensis*

Recorded several times at 750–1,100 m in the South-east, South, East and North Cordillera sectors. Although not mapped for the area by Schulenberg *et al.* (2007), it is not rare at AHR. We have observed it several times since December 1994, usually foraging in undergrowth. DG-O encountered pairs and one was photographed in August 1995.

GREY-BREASTED FLYCATCHER *Lathrotriccus griseipectus* VU

Endemic to the Tumbesian and Marañón Valley EBAs. Rare throughout AHR. In our few sightings in the South-east sector, JB encountered the species alone at mid heights, never low down. Twice seen making short upward sallies from branches to leaves. One was photographed in August 1995. One photographed and another mist-netted in the North Cordillera in August 2009.

PEWEES *Contopus* spp.

Several *Contopus* spp. occur at AHR. Commonest throughout is Tropical Pewee *C. cinereus punensis*—an endemic Tumbesian and Marañón Valley subspecies, treated by some (e.g., Ridgely & Greenfield 2001) as a species (Tumbes Pewee). We observed display-flights in July 1995, in which the birds flew up high and returned to the same branch singing, then opened and closed the tail, and an adult feeding a young in May 1995. During the wet season, migrant Western Wood Pewees *C. sordidulus* from North America are present. Olive-sided Flycatcher *C. cooperi* (NT) is a rare boreal migrant, which JB photographed in October 1994. Smoke-coloured Pewee *C. fumigatus* is a fairly common resident in well-vegetated creeks in the mountains; usually quiet, in August 1995 one sang continuously at dawn on three consecutive days.

BOAT-BILLED FLYCATCHER *Megarynchus pitangua*

Rare; pairs recorded in July and November 2006 in the lower part of the North Cordillera. One was seen in August 2009, also in the North Cordillera. A record of Great Kiskadee *Pitangus sulphuratus* from the South-east sector in the late 1980s probably involved the present species.

RUFOUS FLYCATCHER *Myiarchus semirufus* EN

Endemic to the Tumbesian EBA. DG-O observed a single individual twice in November 2006, at the north-east border of AHR, at c.400 m, as well as once by AM in August 2009 at the southern boundary of AHR, while two were recorded by AM in October 2011 in the East sector, at Overall creek. F. Angulo (*in litt.* 2012) photographed the species in the East sector, around Sauce Grande.

SLATY BECARD *Pachyramphus spodiurus* EN

Endemic to the Tumbesian EBA. Occasionally seen in the South-east and South Cordillera, at 700–900 m. Additionally, one record in the North Cordillera in June 2007, a mist-netted bird at 900 m. Throughout AHR it is rarer than One-coloured Becard *P. homochrous*.

WHITE-TAILED JAY *Cyanocorax mystacalis*

Endemic to the Tumbesian EBA. Very common and very vocal throughout AHR. Two were observed perched on, and removing parasites from, the head of a White-tailed Deer *Odocoileus virginianus*.

SPECKLE-BREASTED WREN *Pheugopedius sclateri paucimaculatus*

Subspecies endemic to the Tumbesian EBA (Ridgely & Greenfield 2001, Schulenberg *et al.* 2007) and is uncommon in AHR. Observed several times in the North Cordillera and East sectors in November 2006, June 2007 and August 2009, the last as part of a mixed flock. We mist-netted several in the Central, North Cordillera and East sectors in November 2006–June 2007.

SUPERCILIATED WREN *Cantorchilus superciliaris*

Endemic to the Tumbesian EBA. Common throughout AHR. We found a completed nest in early September 1995. An individual entered the empty nest twice, but egg laying was not observed. The nest was a woven dome, constructed of an unidentified straw, *Eriotheca discolor* cotton and feathers, suspended on a dry 'tangle weed'. It was 20 cm high and 9 cm wide. The entrance was an oval 5 × 6 cm, its lower border 10 cm from the base of the nest.

BLACK-AND-WHITE TANAGER *Conothraupis speculigera* NT

Winters in Amazonia and breeds in the Tumbesian region during the wet season, when it can be extremely common. Males sing loudly and appear to defend territories. Unlike Witt (2005) in western Cajamarca, Black-and-white Tanager was much commoner than Black-and-white Seedeater *Sporophila luctuosa*—which shares the same plumage pattern, coloration and habitat—in February 1995, and was recorded in most parts of AHR. Nests are mostly sited 1–2 m above ground. In early April, post-breeding, the species largely disappears from AHR. However, we have recorded lingering individuals in the dry season. In August 1992, we saw and mist-netted several in the South-east sector, following heavy rains earlier in the year. Common in the lower North Cordillera and East sectors during the dry season of 2006—although rains were average that year—where we mist-netted two females and a male in July 2006. In November 2006, one male was in the East sector.

WHITE-WINGED BRUSH FINCH *Atlapetes leucopterus*

Endemic to the Tumbesian EBA and common throughout AHR. Above 900 m some individuals have blacker head-sides, similar to Bay-crowned Brush Finch *A. seebohmi*, but with a white wing speculum. One such individual was mist-netted and photographed in December 1999.

BAY-CROWNED BRUSH FINCH *Atlapetes seebohmi*

Endemic to the Tumbesian EBA. Fairly common throughout the mountains. A group of three was observed with White-winged Brush Finches at c.950 m in the South Cordillera in February 2004. *A. seebohmi* was common in the North Cordillera, at c.900 m, in November 2006 and June 2007, and at 1,200 m in August 2009. A group of 12 was seen in Central Angolo in July 2006. Often associates with *A. leucopterus* and Black-capped Sparrows *Arremon abeillei*.

SAFFRON SISKIN *Sporagra siemiradzkii* VU / **HOODED SISKIN** *S. magellanica*

S. siemiradzkii is endemic to the Tumbesian EBA. All *Sporagra* sp. in the extreme west of the area are Hooded Siskins. The status of the two species in the central and eastern AHR is

unclear, where all individuals may belong to one or other species, or both might be present. There, the birds usually occupy watered creeks and ravines, always in small groups, usually of 4–8 individuals. Two Saffron Siskins were mist-netted and collected in August 1997 by M. Castagnola, and besides the orange tone of the yellow plumage, both had a total length under 10 cm (measured by JB). The pair was deposited in the Museo de Historia Natural de la Universidad de San Marcos, Lima, in alcohol; however, the specimens now appear to be lost, so the record must be regarded as unconfirmed.

THICK-BILLED EUPHONIA *Euphonia laniirostris*

Frequently feeds on Loranthaceae mistletoes and *Geoffroea striata* fruits. Nesting and fledging observations in 1994–95 lead us to infer that, at least in some years, the species is double-brooded.

Mixed flocks.—Mixed-species foraging flocks are common, usually led by a group of *Campylorhynchus fasciatus* and comprise 5–7 species. Some flocks are led by a group of *Icterus graceannae*, and only comprise 3–4 species. In groups led by *C. fasciatus* any combination of the following species can occur: *Forpus coelestis*, *Picumnus sclateri*, *Veniliornis callonotus*, Golden-olive Woodpecker *Piculus rubiginosus*, Streak-headed Woodcreeper *Lepidocolaptes souleyetii*, Cranioleuca Antsiensis *Cranioleuca antisiensis*, Rufous-necked Foliage-gleaner *Syndactyla ruficollis*, Collared Antshrike *Thamnophilus bernardi*, Red-browed Peppershrike *Cyclarhis gujanensis*, *Mimus longicaudatus*, Blue-grey Tanager *Thraupis episcopus*, Hepatic Tanager *Piranga flava*, *Arremon abeillei* and *Atlapetes albiceps*. Some of these join mixed flocks only temporarily.

Discussion

Earlier bird lists of AHR included some errors from visits to the area in the 1980s by CDC expeditions. For example, Grey-backed Hawk *Pseudastur occidentalis* is listed for the reserve, but verified records do not exist. Furthermore, a tape-recording of *Thamnophilus bernardi* by the CDC was misidentified as Chapman's Antshrike *T. zarumae* and included as that species in their list.

The bird community at AHR changes during the year, as several species arrive in the area to breed during the wet season, e.g. Yellow-rumped Cacique *Cacicus cela*, *Conothraupis speculigera* and Snowy-throated Kingbird *Tyrannus niveigularis*. Other species that arrive in the area or increase in numbers at this season, like Blue Ground Dove *Claravis pretiosa*, Scrub Nightjar *Nyctidromus anthonyi* or Ochre-bellied Dove *Leptotila ochraceiventris*, might also breed, but there is no clear evidence for this. During the long dry season, species associated with drier forest are common throughout the area, except along wetter creeks, where species associated with wetter habitats concentrate. Additional species will be recorded with further surveys and additional research, as some parts of the reserve have still been hardly visited. Even in well-surveyed areas, some species still require study and possibly specimen collection (e.g. siskins and White-winged Brush Finch). According to the list presented here, El Angolo Hunting Reserve is an important locality for Tumbesian endemics, as it supports 41 endemic species and six endemic subspecies that may deserve species status (Ridgely & Greenfield 2001).

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Data Center (La Molina) provided photographs of some previously unrecorded species. Fernando Angulo accompanied two trips to the area.

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Interesting bird records from the Araguaia River Valley, central Brazil, with comments on conservation, distribution and taxonomy

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SUMMARY.—We present new records that augment, confirm or document our knowledge of the avifauna of the Araguaia Valley in central Brazil, including various first records for the states of Goiás (e.g. Mississippi Kite *Ictinia mississippiensis*, Sanderling *Calidris alba*, Fasciated Antshrike *Cymbilaimus lineatus*, Bobolink *Dolichonyx oryzivorus*), Mato Grosso (Dwarf Tinamou *Taoniscus nanus*, Scarlet-throated Tanager *Compsothraupis loricata*), Pará (*C. loricata*) and Tocantins (e.g., Yellow-billed Cuckoo *Coccyzus americanus*, Pale-rumped Swift *Chaetura egregia*). We also report the first records for the state of Amazonas of Rusty-collared Seedeater *Sporophila collaris* and White-browed Blackbird *Sturnella superciliaris*. Other records improve our knowledge of the distribution of principally Amazonian species in the Cerrado biome or that of comparatively widespread species whose ranges have been consistently under-estimated in the standard literature on Neotropical birds, e.g., Whistling Heron *Syrigma sibilatrix* and Saffron Finch *Sicalis flaveola*. Our field work has also improved knowledge of the distribution and current status of certain Near Threatened (e.g., Chestnut-bellied Guan *Penelope ochrogaster* and Rufous-rumped Seedeater *Sporophila hypochroma*) and globally threatened species (e.g. two *Sporophila* seedeaters, and Kaempfer's Woodpecker *Celeus obrieni*). Additionally, we comment on the natural history and taxonomy of some poorly known species, e.g. Riverside Tyrant *Knipolegus orenocensis xinguensis* and Cone-billed Tanager *Conothraupis mesoleuca*.

The source of the rio Araguaia lies at the junction of the states of Goiás, Mato Grosso and Mato Grosso do Sul, in south-central Brazil, and the river then flows north for c.1,600 km to its confluence with the rio Tocantins, before discharging their joint waters into the rio Pará, the southern branch of the Amazon, very close to its mouth in the Atlantic Ocean. The valley of the Araguaia traverses the states of Goiás, Mato Grosso, Tocantins and Pará, and effectively marks the transition zone between two of Brazil's six major biomes, Amazonia and the Cerrado. Despite its interesting location for students of biogeography and ornithology, the Araguaia Valley has received far less attention from ornithologists than many other parts of eastern Brazil. It is beyond our remit here to provide any more than the briefest of remarks concerning the ornithological history of the region in question, but we would be remiss if we did not acknowledge the first naturalists to collect birds therein, namely Francis de Castelanu (who explored the Araguaia downstream to its confluence with the Tocantins), Auguste de Saint-Hilaire and, thereafter, the indefatigable Johann Natterer, who collected the otherwise completely unknown Hooded Seedeater *Sporophila melanops* in the upper Araguaia Valley in October 1823. We should also mention the pioneering work of G. A. Baer, who spent a considerable period during 1905–06 in Goiás, in particular the months of June to August 1906 at Leopoldina (= Aruanã) on the right (east) bank of the Araguaia, where he discovered a marked, and previously unrealised, Amazonian component to the avifauna (cf. Hellmayr 1908: 13–14). The process of identifying Amazonian elements in

the avifauna of the Cerrado continues until the present day. Thereafter, the contributions of two German ornithologists integral to the development of Brazilian ornithology must be mentioned. Emilie Snethlage collected in Goiás and what is now Tocantins, including the Ilha do Bananal in 1927, and Helmut Sick (together with José Hidasi), who specifically collected birds in Aragarças, Goiás, in 1946, 1952 and 1954 (Silva 1989) but was also generally one of the greatest ornithological explorers of the Cerrado and adjacent regions. One of the most substantial recent contributions on the avifauna of this region, that of Silva (1989), is unfortunately not widely available, although many of the same author's more detailed results were disseminated more accessibly (see, e.g., Silva 1995, 1996a,b, Silva & Oren 1992, 1997). The same lack of widespread availability to some extent blights the important contributions of Hidasi (1983, 1998, 2007) who also provided brief resumes of previous ornithological work in the states of Goiás and Tocantins. Within the last decade, contributions on the avifauna of various parts of this region have increased notably, many of which are mentioned within the context of the species accounts. In particular, the recently created state of Tocantins (1988), formerly the northern part of Goiás, has been subject to notable attention from field workers. Of particular import, we highlight the recent publication by Dornas & Pinheiro (2011) which examined the limits of the Amazonian biome within the latter state, based in large part on important but unpublished collections made in the 1950s, 1960s and 1980s.

The recently published second volume of the Brazilian Important Bird Areas (IBA) programme (De Luca *et al.* 2009) has highlighted the conservation import of the region covered here. Goiás and Tocantins possess 14 IBAs, four of which are shared with either Bahia, Maranhão, Mato Grosso do Sul or Pará, while another area in Mato Grosso (IBA 077) is also relevant to our discussion. Our field work covered parts of five of these 15 IBAs. Furthermore, Stattersfield *et al.* (1998) identified a secondary Endemic Bird Area (EBA) in the region, namely the Rio Araguaia (s031), delimited for the Bananal Antbird *Cercomacra ferdinandi*, to which list can be added an apparently new species of *Certhiaxis* spinetail, to be described by D. R. C. Buzzetti and AW, recognition of which would establish the area as a 'full' EBA. The ranges of five globally threatened birds encompass to some extent (sometimes wholly) the environs of the Araguaia Valley, as follows: Chestnut-bellied Guan *Penelope ochrogaster* (Vulnerable), Kaempfer's Woodpecker *Celeus obrieni* (Critically Endangered), Cock-tailed Tyrant *Alectrurus tricolor* (Vulnerable), Cone-billed Tanager *Conothraupis mesoleuca* (Critically Endangered) and Hooded Seedeater (Critically Endangered). Furthermore, Blue-eyed Ground Dove *Columbina cyanopsis* (Critically Endangered) should certainly be looked for there. It seems probable, based on our observations and those of other recent observers, e.g. T. Dornas, J. F. Pacheco and F. Olmos, that significant numbers of two other globally threatened species, Marsh *Sporophila palustris* (Endangered) and Chestnut Seedeaters *S. cinnamomea* (Vulnerable), which breed in the south-east of the continent, spend the austral winter in the region (Dornas *et al.* 2013). Furthermore, the Araguaia Valley also harbours important populations of several Near Threatened birds, among them Orinoco Goose *Neochen jubata*, Blue-winged Macaw *Primolius maracana*, Yellow-faced Parrot *Alipiopsitta xanthops* and Coal-crested Finch *Charitospiza eucosma*. Important concentrations of waterbirds (and migrants, e.g. Purple Martin *Progne subis*: Olmos & Pacheco 2008) are also known from parts of the Araguaia Valley, especially within the region of the Ilha do Bananal in south-west Tocantins.

Our field work in the Araguaia Valley was principally conducted within the context of searches for the long-lost Hooded Seedeater (by GMK) or during bird tours and related scouting trips to the region (AW & KJZ). Consequently, many localities were visited relatively briefly and their avifaunas subject to comparatively cursory investigation. Full

details of our work in search of Hooded Seedeater will be reported separately elsewhere (Areta *et al.* submitted).

Other observers and museum acronyms

Other observers are generally indicated by their initials, as follows: David Beadle (DB), Simon Colenutt (SC), Arthur Grosset (AG), Jeremy Minns (JM), Chris Parrish (CP), Jonathan Price (JP), William Price (WP) and Hadoram Shirihai (HS). Relevant specimens were examined or are referenced in the following institutions: Louisiana State University Museum of Zoology (LSUMZ), Museu Nacional do Rio de Janeiro (MNRJ), Museu de Ornitologia de Goiânia (MOG), Museu Paraense Emílio Goeldi, Belém (MPEG), Museu de Zoologia da Universidade de São Paulo (MZUSP) and the Natural History Museum, Tring (NHM). Records archived online at Wikiaves (www.wikiaves.com.br) are indicated by WA and their database number.

Species accounts

BRAZILIAN TINAMOU *Crypturellus strigulosus*

The species' distinctive vocalisation was heard in tall forest c.5 km south of Senhor do Bonfim, Tocantins (08°67'S, 49°41'W), on 6 January 2009 (GMK, JP, WP). Pinto (1937) mentioned its occurrence as far east as Pará and south to northern Mato Grosso, e.g. at the rio Guaporé (11°54'S, 65°01'W). However, until recently, *C. strigulosus* does not appear to have been previously mentioned in the literature from the right bank of the Araguaia in Tocantins (see, e.g., Hidasi 1983, 1998, 2007, Sick 1997, Pinheiro & Dornas 2009a), despite the map in Davies (2002). Nonetheless, it was recorded in tall forest around Presidente Kennedy, in central Tocantins, by Raposo (2013), while E. Sneathlidge collected a female at Furo de Pedra (c.10°28'S, 50°23'W), in the Ilha do Bananal, on 15 September 1927 (MNRJ 4486), and there is also a female specimen from Barra do Garças (15°53'S, 52°15'W), Mato Grosso, at the border with Goiás, taken on 25 June 1973 (MNRJ 33231) by O. Junqueira.

DWARF TINAMOU *Taoniscus nanus*

One singing in rather degraded *campo sujo* near Araguainha, in extreme eastern Mato Grosso (17°13'S, 53°19'W), on 25 December 2008 (GMK, JP, WP). This globally threatened Brazilian endemic, which is currently categorised as Vulnerable, is known from a relatively small number of localities in Minas Gerais, the Distrito Federal, Goiás, Mato Grosso do Sul, São Paulo and, at least formerly, Paraná (Collar *et al.* 1992, BirdLife International 2008). It was also found at two localities in the Jalapão region of eastern Tocantins recently (Pacheco & Olmos 2010). This is the first record from Mato Grosso, albeit from a locality only just inside the state.

CHESTNUT-BELLIED GUAN *Penelope ochrogaster*

Considered globally Vulnerable and endemic to Brazil (BirdLife International 2008). Recorded on all seven visits to Caseara, Tocantins (09°24'S, 49°96'W), in small numbers, where it is common in Parque Estadual do Cantão (Pinheiro & Dornas 2009a) and has been found at nearby Santana do Araguaia (Olmos 2003). The species is present in both recently declared Important Bird Areas in this region (De Luca *et al.* 2009). In addition, singles and pairs were seen in gallery forest along the rio das Mortes, near Novo Santo Antônio, Mato Grosso, on 5–6 May 2004 (AW), two were at the Reserva Ecológica da Serra Azul (15°05'S, 52°16'W), just west-northwest of Barra do Garças, in easternmost Mato Grosso, on the left

bank of the rio Araguaia, on 26 December 2008, and two were at the rio Caiapó (09°12'S, 49°74'W), between Caseara and Araguacema, Tocantins, on 3 January 2009 (GMK, JP, WP). Other sightings involved one at Montes Claros de Goiás, Goiás, on 2 July 2010, with six in seasonally flooded forest beside the rio Araguaia, in Mato Grosso, opposite Britânia, Goiás (14°97'S, 51°31'W), on 5 July 2010 (GMK, WP). The status of this Brazilian endemic cracid, which is currently considered Vulnerable, was reviewed by Olmos (2003), del Hoyo & Motis (2004) and BirdLife International (2008). Our Mato Grosso records are the first to be published from this part of the state (where it is otherwise known only from the northern Pantanal, in southern Mato Grosso) and we also confirmed that the species persists in west-central Goiás, from where there were no published records since 1933 (del Hoyo & Motis 2004). B. W. Davis has recorded this species at Pousada Kuryala (11°48'S, 50°42'W), 14 km north of São Félix do Araguaia, also just inside Mato Grosso but even further north, suggesting that the species' range is far more extensive and much less disjunct in the Araguaia Valley than previously suspected. Nonetheless, care is needed in identifying smaller cracids in this region, as Rusty-margined Guan *P. superciliaris jacupemba* is also present, e.g. four were seen and heard in dry forest just north of Registro do Araguaia, Goiás, on 3 July 2010 (GMK, WP). The January 2009 record is the northernmost to be published, following a specimen from Araguatins (05°38'S, 48°07'W) (Dornas & Pinheiro 2011), although the range extension from the Parque Estadual do Cantão, just south-west of Caseara, is only c.40 km, and a possible record was published by Lopes & Braz (2007) from the rio Sono (09°09'S, 47°59'W), near Pedro Afonso, in central Tocantins, at an almost identical latitude. Furthermore, there is a specimen in the Museu de História Natural Taubaté (no. 2836) also from the rio Caiapó, collected by H. Alvarenga in 1989, and considered by Sick (1997) and its collector to represent *P. pileata*, although its coloration is apparently more typical of the present species (M. A. Crozariol *in litt.* 2014). There are also probable records from Wanderlândia and Santa Fé do Araguaia (SEPLAN 2005 *in* Pinheiro & Dornas 2009a; T. Dornas *in litt.* 2015). Additional records exist from elsewhere in central (Pinheiro & Dornas 2009a) and in eastern Tocantins (Pacheco & Olmos 2006, 2010); the species is locally common in the valley of the rio Paranã, in the south-east of the state, and overlaps with White-browed Guan *P. jacucaca* in the Jalapão region. As noted by all other modern commentators, there are no records from the Pirapora region of north-central Minas Gerais since 1913, when collected by E. Garbe (Pinto 1937), and given the degree of recent ornithological work in this region (*cf.*, for instance, Raposo *et al.* 2002, Kirwan *et al.* 2004, Vasconcelos *et al.* 2006) it appears that the species has genuinely disappeared from there.

WHITE-CRESTED GUAN *Penelope pileata*

Range generally stated to encompass a relatively small area of eastern Amazonia south of the Amazon, from the lower rio Madeira, in Amazonas state, as far as the lower rio Tapajós, i.e. principally within the state of Pará (del Hoyo & Motis 2004). The species was not listed for Tocantins by Hidasi (1998). However, Buzzetti (2004) registered it in Parque Estadual do Cantão, prior to the park's delimitation, from where we have records on 20 August 2004 (one; AW) and 9 January 2013 (three; GMK, HS), and the species is considered uncommon within the nearby gallery forests of the rio do Coco and its tributaries (De Luca *et al.* 2009, Pinheiro & Dornas 2009a); see also the previous species. White-crested Guan has also recently been recorded at fewer than a handful of localities in Maranhão (F. Olmos & J. F. Pacheco *in* BirdLife International 2008). A group of four was observed and photographed at Rancho Isadora (10°49'S, 49°71'W), just east of Lagoa da Confusão, Tocantins, on 13 July 2010 (GMK, WP; Fig. 1), extending the range of the Near Threatened *P. pileata* fractionally further south.

WHISTLING HERON *Syrigma sibilatrix*

Hidasi (1998) did not list this open-country heron for the state of Tocantins. Subsequently, however, Pacheco & Olmos (2010) amply demonstrated how this species' range through central Brazil has been expanding in recent years, and how some authors have consistently under-estimated its distribution in this region (the map in Kushlan & Hancock 2005: 211 is a classic example). Furthermore, Pereira *et al.* (2008) presented the first record for Pernambuco and J. F. Pacheco (*in litt.* 2014) & F. Olmos observed the species in southern Maranhão in September 2006. We can add that the species is reasonably common, in the large amount of suitable habitat available, throughout all areas of the Araguaia Valley that we have surveyed, from Emas National Park (18°45'S, 52°45'W) in the south, to Barreira do Campos, Pará, in the north, and including all four states, namely, Goiás, Mato Grosso, Pará and Tocantins.

LITTLE BLUE HERON *Egretta caerulea*

With the exception of the Pantanal population and very small numbers (both adults and young birds) along the Amazon and its main tributaries (AW pers. obs.), *E. caerulea* is of almost exclusively coastal distribution in Brazil (Sick 1997, Kushlan & Hancock 2005). There is perhaps just one previous record in Tocantins (Hidasi 1998 did not mention the species for the state): Pinheiro & Dornas (2009a) reported an adult (dark morph) in January 2006 within the Parque Estadual do Cantão, at the confluence of the rios do Coco and Araguaia (T. Dornas *in litt.* 2015). A dark-morph adult was observed for several minutes at c.200 m range through a telescope in a pool beside the rio Formoso, west of Lagoa da Confusão, Tocantins, on 13 July 2010 (GMK, WP).

ZIGZAG HERON *Zebrilus undulatus*

Recorded at three localities in the northern Araguaia Valley, namely between Caseara and the rio Araguaia, Tocantins, on 22 and 25 August 2002 (AW, KJZ; tape-recorded) and 19 August 2004 (AW); just east of Santa Maria das Barreiras, Pará (08°81'S, 49°61'W), on 5 January 2009 (GMK, JP, WP); and at Rancho Isadora, west of Lagoa da Confusão, Tocantins, on 13 July 2010 (GMK, WP). All three sites are in reasonably close proximity to the Parque Estadual do Cantão and Área de Proteção Ambiental Ilha do Bananal, and *Zebrilus* was photographed in the former area in October 2011 (A. F. Barbosa; WA462977). The only previous records for Tocantins appear to be two specimens from Araguatins and one from Couto de Magalhães (Dornas & Pinheiro 2011), with the result that the species has frequently been omitted from the avifauna of the state (Sick 1997, Hidasi 1998, Kushlan & Hancock 2005).

LONG-WINGED HARRIER *Circus buffoni*

Pale-morph adult males were observed over *cerrado* at Barreira do Campo, south-east Pará (09°22'S, 49°99'W), on 12 September 2004 (GMK *et al.*) and 8 January 2013 (GMK, HS), and another similarly plumaged bird was seen in heavily modified *cerrado* between Lagoa da Confusão and Barreira da Cruz, Tocantins, on 19 November 2011 (GMK *et al.*), from where there is also an earlier record of one, on 4 July 2003 (J. F. Pacheco *in litt.* 2014). The latter two dates seem unusual for this austral migrant (*cf.*, also, Kirwan & Shirihai 2008). Although far from the northernmost available Brazilian records (in Amapá, and at Santarém and on the Ilha do Marajó, Pará: Hellmayr & Conover 1949, Sick 1997), there are relatively few reports of this austral migrant further north than Goiás (for which state it is not even listed by Hidasi 2007), despite that it perhaps breeds in Emas National Park (AW pers obs.). Pinheiro & Dornas (2009a) considered it an extremely rare visitor to the Parque Estadual do Cantão,

Tocantins, where a single was seen on 21 August 2004 (AW), but we have been unable to locate other records in the state and Hidasi (1998) did not mention *C. buffoni* for Tocantins.

MISSISSIPPI KITE *Ictinia mississippiensis*

The first record for Goiás involved three (two adults and an immature) apparently on migration, moving south low over Emas National Park (18°45'S, 52°45'W) on 7 November 2007 (AW). Whittaker *et al.* (2008) reviewed status in Brazil, demonstrating that the species is much commoner on migration through the country than previously thought, principally via the Pantanal region (see, also, Vasconcelos *et al.* 2008), and listed several winter records, all of them recent.

RED-THROATED CARACARA *Ibycter americanus*

Not listed for Goiás by Hidasi (2007), despite that Hellmayr (1908: 89) and Pinto (1936, 1937: 87) already mentioned a total of four specimens from the west-centre of the state, two males from the rio Thesouras (= Tesouras; 14°36'S, 50°51'W) and a male and female from the rio das Almas (14°35'S, 49°02'W), respectively, with four photographic records from northern Goiás (www.wikiaves.com.br). Authors of more general works also map *I. americanus* for the state (e.g. Bierregaard 1994, Ferguson-Lees & Christie 2001). Given the general lack of specific dated records that have been published we mention the observation of three individuals just north of Aragarças, Goiás (15°55'S, 52°15'W), on 4 July 2010 (GMK, WP).

GREY-BREASTED CRAKE *Laterallus exilis*

One observed feeding in wet grassland at Caseara, Tocantins, on 20 August 2004 (CP, AW). Species easily overlooked. Listed for the Parque Estadual do Cantão, Tocantins, by Buzzetti (2004), but not recorded in this region by others (Pinheiro & Dornas 2009a) and not mapped for Tocantins by general works (e.g., Taylor & van Perlo 1998, Gwynne *et al.* 2010).

SANDERLING *Calidris alba*

We report the first record for Goiás, a juvenile at Chapadão do Céu, just east of Emas National Park, on 6 November 2007 (AW), foraging on a small man-made pit at the edge of the town. The previous night a large storm had apparently disoriented several hundreds of *Dendrocygna* whistling ducks, which had been flying around calling for hours, and which were also present at isolated ponds around the town next morning. This remarkable occurrence has few precedents in South America: Ridgely & Greenfield (2001) mentioned two inland records from the río Napo drainage in Ecuador, while Hilty & Brown (1986) noted rare inland occurrences in Colombia (e.g. in the Cauca Valley) and one was also recently recorded in southern Mato Grosso, in September 2013: G. Homel *et al.* in Kirwan *et al.* 2014a). Sick (1997) mentioned only coastal records in Brazil.

GOLDEN-COLLARED MACAW *Primolius auricollis*

Range in Brazil grossly under-represented by most handbooks and field guides (e.g. Collar 1997, Sick 1997, Juniper & Parr 1998), wherein the species is usually considered to be restricted to the environs of the Pantanal of Mato Grosso. In fact, Golden-collared Macaw is reasonably widespread through the Araguaia Valley at least as far north as south-east Pará and central-west Tocantins, although there are very few published records from this region, other than from Parque Estadual do Cantão, Tocantins (where it is reasonably common: Buzzetti 2004, Pinheiro & Dornas 2009a; AW, KJZ pers. obs.). However, it should be remarked that Hidasi (1998) mapped the species for south-west Tocantins, and it has been recorded at Presidente Kennedy in the centre of the state (Raposo 2013), although the

provenance of these birds requires confirmation. We have observations (some documented with photographs) of *P. auricollis* from the following localities: Araguiana, Mato Grosso (<10 on 29 December 2008: GMK, JP, WP), between São Miguel do Araguaia and Luís Alves, Goiás (40 on 9 July 2010: GMK, WP), Rancho Isadora, west of Lagoa da Confusão, Tocantins (10°49'S, 49°71'W: max. 11 on 12 July 2010: GMK, WP), and Barreira do Campo, Pará (max. 19 on 12 September 2004: GMK *et al.*). Elsewhere, in the same general region, *auricollis* was fairly common (small flocks seen daily) along the rio das Mortes, near Novo Santo Antônio, Mato Grosso, on 4–7 May 2004 (AW).

HELLMAYR'S (SANTARÉM) PARAKEET *Pyrrhura amazonum microtera*

Globally threatened (Endangered) species considered endemic to east Amazonian Brazil (*vide* Joseph 2002) but the taxonomy of Amazonian *Pyrrhura* almost certainly requires additional elucidation (*pers. obs.*). Three perched at the edge of a large anthropogenic clearing within tall forest c.5 km south of Senhor do Bonfim, Tocantins (08°67'S, 49°41'W), on 6 January 2009 (photographed; GMK, JP, WP). This is the second specific published locality for the state: *P. picta* was mapped for the northernmost part of Tocantins by Hidasi (1998) based on 14 specimens collected in Araguatins (Dornas & Pinheiro 2011) and there are records from five other localities in the north of the state available at www.wikiaves.com.br. *P. amazonum* was not listed for the Parque Estadual do Cantão (Buzzetti 2004, Pinheiro & Dornas 2009a) and no specimens of this recently recognised species were listed from the right bank of the Araguaia, or from any nearer than São João do Araguaia, Pará (05°23'S, 48°46'W) by Joseph (2002). West of the rio Xingu, this taxon was reported to reach as far south as the rio Teles Pires in northern Mato Grosso, although considerable confusion exists as to how many or which taxa within the *P. picta* group are present in the latter region, given that birds apparently corresponding to Madeira Parakeet *P. snethlageae* have also been photographed there (see *Cotinga* 20: 62). The latter were described as a new subspecies, *P. snethlageae lucida* by Arndt (2008).

SCARLET-SHOULDERED PARROTLET *Touit huetii*

A group of four flew high (c.30 m) overhead vocalising just north of Caseara, Tocantins, in the early morning of 1 January 2009 (GMK); they had presumably recently left a roost, and they appeared to continue across the rio Araguaia into Pará. The closest records appear to be from Marabá, Pará (Sick 1997), the Serra dos Carajás in the same state (Pacheco *et al.* 2007), and Araguatins, Tocantins, from where a total of seven specimens (taken in the 1960s) are available (Dornas & Pinheiro 2011). Their existence was not widely known previously, thus *T. huetii* was not mentioned for Tocantins by Collar (1997), Hidasi (1998), Juniper & Parr (1998) or Sick (1997), but there is a somewhat 'aberrant' record for northern Goiás mentioned in Juniper & Parr (1998). The latter (source unknown) is presumably indicative of the species' propensity to wander in the non-breeding season (Collar 1997, Juniper & Parr 1998) or might suggest that *T. huetii* is more generally nomadic across its range, rather than solely in upper Amazonia (Parker *et al.* 1991). In contrast, Hidasi (1983, 2007) does not mention this parrotlet for Goiás. More recently, T. Dornas (*in litt.* 2015) & S. M. Dantas observed the species in forest bordering the rio Araguaia near Pau Darco, north of Conceição do Araguaia, in November 2013. As noted by Whittaker & Oren (1999) and Whittaker (2009), this and other species of *Touit* parrotlets are easily overlooked or must remain unidentified by field workers unfamiliar with their generally distinctive vocalisations. Observing the diagnostic plumage characters of each species is often impossible given the views obtained during most encounters with members of this genus. In consequence, this species was scarcely known in Brazil until c.50 years ago (Sick 1957a).

YELLOW-FACED PARROT *Alipiopsitta xanthops*

We follow Caparroz & Pacheco (2006) in employing the genus *Alipiopsitta* for this species. Considered Near Threatened (BirdLife International 2008), the range of this Cerrado endemic encompasses the interior of Maranhão and Piauí south to Minas Gerais, western São Paulo (along the rio Paraná) and Mato Grosso do Sul, with two records from north-central Bolivia (Sick 1997, BirdLife International 2008). Over most parts of the Araguaia Valley surveyed by us it seems genuinely rare, especially away from Emas National Park, in south-west Goiás, where Yellow-faced Parrot remains relatively numerous (De Luca *et al.* 2009; GMK, AW, KJZ pers. obs.). In contrast, Pinheiro & Dornas (2009a) listed it as rare in the Área de Proteção Ambiental Ilha do Bananal, Tocantins, and in the same state the species is obviously not common in the Jalapão (Pacheco & Olmos 2010). In south-east Tocantins, Pacheco & Olmos (2006) found it to be most numerous only in the *cerrados* of the rio Palmeiras Valley, while in central Tocantins *A. xanthops* was recorded at two localities in the environs of Pedro Afonso (Lopes & Braz 2007) and at Presidente Kennedy (Raposo 2013). We have other records from the following localities: 18 at the rio Babilônia, 2 km west of Santa Rita do Araguaia, Goiás (17°34'S, 53°19'W), on 25 December 2008; 35, 10 km west of Aragarças, Goiás (15°91'S, 51°95'W), on 27 December 2008; two between Bom Jardim do Goiás and Baliza, Goiás (16°14'S, 52°32'W), on 28 December 2008; seven south of Registro do Araguaia, Goiás (15°88, 51°78'W), on 3 July 2010; one near Cangas, north of Aruanã, Goiás (14°55'S, 50°93'W), on 7 July 2010 (GMK, JP, WP); and small flocks, totalling *c.*30, in the Parque Estadual do Cantão, Tocantins, on 21 August 2004 (AW). No previous records from the last-named locality (Buzzetti 2004). Elsewhere, this parrot was fairly common in *cerrado* and *varjão* 8 km south of Novo Santo Antônio, Mato Grosso, on 4–7 May 2004, with max. 7 on 6 May, and pairs were very silent, perhaps suggesting they were breeding at the time (AW). It is worth mentioning that during rapid surveys, such as ours, smaller numbers of this species could easily be missed among the much commoner Turquoise-fronted *Amazona aestiva* and Orange-winged Amazons *A. amazonica*.

YELLOW-BILLED CUCKOO *Coccyzus americanus*

Not previously listed for the state of Tocantins (Hidasi 1998, Dornas 2009), although a photographic record was recently published from December 2010 (D. Rodello; WA 255397). One was well observed in bushy *cerrado* on the right bank of the Araguaia, just north of the town of Couto de Magalhães, on 4 November 2011, by four observers familiar with the species (GMK *et al.*). Extensive rufous in the primaries was clearly seen when the bird flew, eliminating the possibility of the similar Pearly-breasted Cuckoo *C. euleri*, a species familiar to the observers, and which is already recorded from the state. Subsequently, Raposo (2013) documented *C. americanus* around Presidente Kennedy, taking photos and a specimen.

WHITE-WINGED NIGHTJAR *Eleothreptus candicans*

A globally threatened species currently known from just four localities, with Emas National Park one of its strongholds. Unusual among Neotropical nightjars in being generally silent, its voice was first described by Cleere (1998) and Clay *et al.* (2000). In flight displays, males emit an unusual, mechanical *grrrrt*, apparently using the wings. To our knowledge, there are no breeding records or tape-recordings from Brazil. On 24 November 2011, at dusk on a windless night, a displaying adult male in *campo sujo* adjacent to the old airstrip at Emas uttered a strange, easily overlooked insect-like trill at close range, extremely reminiscent of Sickle-winged Nightjar *E. anomalus*, albeit on an even lower pitch (AW). The bird called just twice and could not be recorded. This suggests nesting during November–December in Brazil. In April 2001, GMK *et al.* observed *c.*10–20 individuals (both sexes) in the park, but

saw no evidence of display or other evidence of breeding. Relatively little is known of the species' reproductive behaviour, with the first nest discovered only in November 1997; the clutch of two is laid directly on the ground, adjoining a small 'clearing', within grassland (Clay *et al.* 2014). In Paraguay, it nests in September–December (Clay *et al.* 2000), conforming well to our experience in Emas.

SAND-COLOURED NIGHTHAWK *Chordeiles rupestris*

Small groups of <10 individuals were seen pre-dawn on 20 August 2004 (AW), towards dusk on 11–12 September 2004 (GMK *et al.*) and again on 10 January 2013 (GMK, HS), over the rio do Coco, near Caseara, Tocantins. Buzzetti (2004) and Pinheiro & Dornas (2009a) also had several records of this species from the Parque Estadual do Cantão, just south of Caseara. Hidasi (1998) had already mapped the species as being present in the northernmost part of the state. These appear to be the first published records with specific dates and numbers from Tocantins, and a range extension of at least 225 km. Although Cleere (1998) mapped *C. rupestris* as occurring over most of Amazonian and eastern Brazil, this is erroneous; as noted by Sick (1997) and Holyoak (2001), the range of this species extends from upper Amazonia as far as the rio Xingu south of the Amazon.

PALE-RUMPED SWIFT *Chaetura egregia*

At least two individuals were closely observed within a flock of *Chaetura* spp., of which most were Sick's Swifts *C. meridionalis*, over *cerrado* at Emas National Park, Goiás, on 22 December 2008 (GMK, JP, WP). There were also many Fork-tailed Palm Swifts *Panyptila cayennensis* in the vicinity, nesting in *Mauritia* palms within a nearby gallery forest. Prevailing weather conditions were cloudy, with sunny spells and almost no wind. GMK has extensive experience of this species from the Serra dos Carajás (see below), eastern Peru and south-east Ecuador in the Cordillera del Cóndor, as well as of all the potential confusion species from various localities across Amazonia. The very extensive pale rump and uppertail-coverts are almost whitish in this species, and very contrasting compared to any other 'grey-rumped' *Chaetura*, although in bright sunlight Grey-rumped Swift *C. cinereiventris* can appear almost as strikingly pale-rumped (pers. obs.). The underparts of the two *C. egregia*, other than the throat and upper breast, appeared on average darker than those of Grey-rumped Swift based on previous experience. Band-rumped Swift *C. spinicaudus* also has an obviously white rump patch, but this is restricted to a much narrower band, whilst the overall plumage, at least in central Brazilian *C. s. aethalea*, is rather darker and blacker than in *C. egregia*. Wing length of the two birds at Emas was estimated to be similar to that of the nearby *C. meridionalis*, whereas *C. cinereiventris* would have been obviously shorter winged in such comparative views. Additionally, a Pale-rumped Swift was well observed under good light conditions with three Short-tailed Swifts *C. brachyura* (see below) at Rancho Isadora, just east of Lagoa da Confusão, Tocantins (10°49'S, 49°71'W), on 10 July 2010 (GMK, WP). *C. egregia* was, until very recently, considered to be largely restricted to western Amazonia, from eastern Ecuador and Peru south to northern Bolivia and east only as far as Acre, in western Brazil (Chantler & Driessens 2000, Marín 2000), with apparently anomalous records from central Brazil, at the Serra do Roncador, in Mato Grosso, August and September (Fry 1970, Sick 1997), and uncertain sightings from the region of the Chapada dos Guimarães, in the south-west of the same state (Willis & Oniki 1990). In respect of the latter, Lopes *et al.* (2009) failed to find this species in the region. However, since then *C. egregia* has been discovered in Brazil much further north and east, e.g. in the Alta Floresta region, Mato Grosso (Zimmer *et al.* 1997, Lees *et al.* 2008), as well as 27 km south of Cachoeiras do Curuá, in the Serra do Cachimbo (Pacheco & Olmos 2005),

and in the Serra dos Carajás, in Pará (Pacheco *et al.* 2007; many observers), as well as at two localities in Rondônia (Stotz *et al.* 1997). These appear to be the first published records for the states of Goiás and Tocantins (Hidasi 1983, 1998, 2007), although we are aware of another recent, unpublished, sighting of Pale-rumped Swift from the same area of Tocantins (G. Bernardon *in litt.* 2010).

SHORT-TAILED SWIFT *Chaetura brachyura*

Three seen well in good light conditions, in company with a single Pale-rumped Swift *C. egregia*, at Rancho Isadora, just east of Lagoa da Confusão, Tocantins (10°49'S, 49°71'W), on 10 July 2010 (GMK, WP), and eight observed for at least one hour on the outskirts of Divinópolis do Tocantins, Tocantins, on 12 January 2013 (GMK). Both observers are highly familiar with this species from Amazonia, and it is, in any case, one of the most easily identified *Chaetura*, given its distinctive wing shape (bulging mid-wing with pinched-in innermost secondaries), which afford the species' impression of being almost tail-less. General references (e.g., Sick 1997, Hidasi 1998, Chantler & Driessens 2000) do not mention this species for Tocantins, but its occurrence is unsurprising given that GMK has many records of *C. brachyura* from the left bank of the Araguaia, in Pará, opposite Caseara.

HORNED SUNGEM *Heliactin bilophus*

AW observed a female in roadside *cerrado* c.25 km east of Caseara, Tocantins, on 18 August 2004. This appears to be a slight north-westwards range extension, compared to the map in Gwynne *et al.* (2010), although Hellmayr (1929) reported a male specimen from Tranqueira, Maranhão, taken in September 1925.

SPOTTED PUFFBIRD *Nystactes tamatia*

KJZ & AW saw and/or heard (KJZ tape recording) 6+ individuals in or bordering riverine forest on the west bank of the rio Araguaia directly opposite Caseara, Pará, on 25 August 2002, and KJZ recorded another from a river island in the Araguaia south of Caseara on 26 August 2002. Singles seen or heard in seasonally flooded forest abutting the rio do Coco, near Caseara, Tocantins, on 25 January 2002 (GMK, DB, AG, JM) and 1 January 2009 (GMK, JP, WP), come from the same general area as the Parque Estadual do Cantão, where the species was found at several localities by Buzzetti (2004) and Pinheiro & Dornas (2009a). It has also been found even further east, around Palmas (Pinheiro 2004) and Presidente Kennedy (Raposo 2013). Despite its apparent relative abundance in this general area, these records seem to be the southernmost for Tocantins, where it was known from specimens taken at Araguatins (Silveira *et al.* 2001) and Couto de Magalhães (Dornas & Pinheiro 2011); we also have a sight record from the latter on 4 November 2011 (GMK *et al.*). Virtually all other records south of the Amazon are from west of the upper rio Xingu (Sick 1997, Rasmussen & Collar 2002), with the exception of those in the Serra dos Carajás, Pará (Pacheco *et al.* 2007). The species was not mentioned for Tocantins by Hidasi (1998). We follow Rasmussen & Collar (2002) and Penhallurick (2008) in removing this species from *Bucco*.

CHECKERED WOODPECKER *Picoides (Veniliornis) mixtus*

A male of this uncommon and easily overlooked woodpecker was tape-recorded in tall *cerrado* 8 km north of Novo Santo Antonio, Mato Grosso, on 5 May 2004 (AW). AW & KJZ observed and tape-recorded a female in mature *cerrado* on the west bank of the Araguaia close to Barreira do Campo, Pará, on 25 August 2002, which record is from the same area as that reported by Beadle *et al.* (2004a) as the first for the state. The record from Mato Grosso reported here represents a considerable northwards range extension within the state from

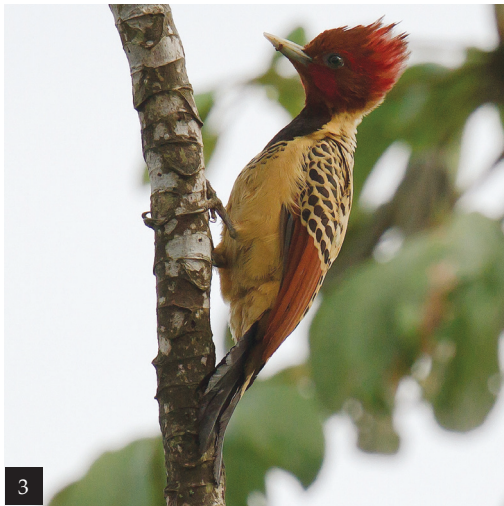
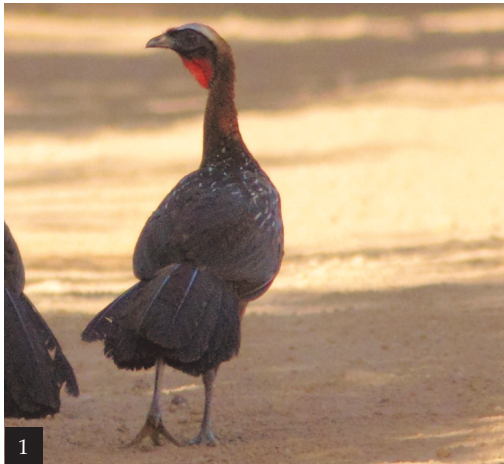


Figure 1. White-crested Guan *Penelope pileata*, Rancho Isadora, just east of Lagoa da Confusão, Tocantins, July 2010 (© W. Price)

Figure 2. Ringed Woodpecker *Celeus torquatus*, Caseara, Tocantins, January 2009 (© W. Price)

Figures 3–4. Male and female Kaempfer's Woodpecker *Celeus obrieni*, between Caseara and Araguacema, Tocantins, January 2011 (© H. Shirihai / *Photographic handbook of the birds of the world*)

Figure 5. Amazonian Inezia *Inezia subflava*, Caseara, Tocantins, January 2009 (© W. Price)

Figure 6. Spotted Tody-Flycatcher *Todirostrum maculatum*, Araguacema, Tocantins, January 2009 (© W. Price)

the only previous records we can locate, at Itiquira, in the extreme south-east, on 3 February 2011 (E. Legal, WA 296066), and 24 August 2013 (WA 1248792).

RINGED WOODPECKER *Celeus torquatus*

A pair of the subspecies *C. t. occidentalis* was observed several times responding to playback, and photographed by WP, on 1–2 January 2009 at Caseara, Tocantins, in seasonally inundated gallery woodland beside the rio Araguaia (GMK, JP, WP; Fig. 2), with a male observed in response to playback in the same area on 19 August 2004 (AW). Winkler & Christie (2002) mapped its range east as far as the state of Pará. Pacheco & Olmos (2006) reported a sight record, which they considered to be the first from the state (the species being not listed by Hidasi 1998), in a gallery forest in south-east Tocantins, on 12 October 2004. With hindsight, their brief observation could perhaps have involved the subsequently rediscovered Kaempfer's Woodpecker *C. obrieni* (Prado 2006). However, the species had already been found at several sites within the Parque Estadual do Cantão, just south-west of Caseara, by Buzzetti (2004). In contrast, Pinheiro & Dornas (2009a) had just a single record (involving a lone individual) from the region, beside the rio do Coco. Our observations probably represent the first documented state records, although several photographs have since become available from Araguatins and Caseara (www.wikiaves.com.br).

KAEMPFER'S WOODPECKER *Celeus obrieni*

This recently rediscovered taxon is now known to be both meritorious of species rank (as first speculated by Whittaker & Oren 1999) and to be a reasonably widespread (if low-density) resident of *tabocais* in the state of Tocantins (De Luca *et al.* 2009, Dornas *et al.* 2014), with additional records from southern and central Maranhão (Dornas *et al.* 2014), south-west Piauí (Santos & Vasconcelos 2007) and Goiás. In the latter state, there are now records from the following localities, all in the north: Guapó (specimens), Niquelândia (specimen) (Hidasi *et al.* 2008, Dornas *et al.* 2009) and the rio do Ouro, Porangatu municipality (photograph: Pacheco & Maciel 2009). It has been suggested that the species should also be searched for in parts of south-easternmost Pará (Dornas *et al.* 2014). A male was seen briefly and heard in dry forest with extensive flowering bamboo surrounded by *cerrado* (habitat similar to many known localities in Tocantins) 5 km south of Registro do Araguaia, Goiás (15°44'S, 51°50'W), on 3 July 2010 (GMK, WP). The moderately distinctive *ochraceus* subspecies of Blond-crested Woodpecker *C. flavescens* was present at the same locality (treated specifically by del Hoyo & Collar 2014, under the English name Ochre-backed Woodpecker). This apparently marks the south-west limit of the published range of *C. obrieni* to date, although the locality at Guapó (c.16°49'S, 49°31'W) is marginally further south. Finally, a pair was photographed in a relatively small patch of bamboo-dominated forest between Caseara and Araguacema (09°12.914'S, 49°49.422'W) on 10 January 2013 (GMK, HS; Figs. 3–4). Our searches elsewhere in the Araguaia Valley in Goiás and neighbouring Mato Grosso for this species, using playback, including of the distinctive female voice (*cf.* A. D. Prado recording, XC28191), have to date proved fruitless, despite the presence of unquestionably suitable habitat. However, the species has been found at one locality in eastern Mato Grosso in recent years (Dornas *et al.* 2011).

ARAGUAIA SPINETAIL *Synallaxis simoni*

Observed and tape-recorded in second growth at Rancho Jatobá, on the rio das Mortes, 8 km north of Novo Santo Antônio, Mato Grosso, on 4 May 2004 (AW), while an adult was photographed a few km south of Novo Santo Antônio on 15 March 2012 (R. E. F. Santos; WA 628504). Often considered a subspecies of White-lored Spinetail *S. albilora* (e.g.,

by Remsen 2003), the range of *S. simoni* is virtually confined to the Ilha do Bananal, in Tocantins, although it also occurs on islands in the Araguaia close to Barreira de Campos and on the Pará side of the Araguaia (all authors pers. obs.), which state was not mentioned for this taxon by Remsen (2003); it has now been found east to Fazenda Fartura (09°40'S, 50°23'W) (Somenzari *et al.* 2011). The extent of its distribution in north-eastern Mato Grosso remains to be precisely determined.

GREATER THORNBIRD *Phacellodomus ruber*

Fairly common (tape-recorded) along the rio das Mortes, in riverine scrub at Novo Santo Antônio, Mato Grosso, on 4 May 2004 (AW). There seems to be few records from eastern Mato Grosso, in which state the species is mainly known from the south (www.wikiaves.com.br). Also, 6–10 observed/heard and tape-recorded by KJZ & AW along the east bank of the Araguaia and on a river island south of Caseara, Tocantins, on 23 August 2002, with 10+ on river islands south of Caseara on 24 August 2002 and one there on 26 August 2002.

FASCIATED ANTSHRIKE *Cymbilaimus lineatus*

A female was closely observed for *c.*5 minutes, foraging in seasonally inundated gallery woodland dominated by many small *Mauritia* palms and dense bamboo, beside the rio Formoso in Emas National Park, Goiás, on 22 December 2008 (GMK, JP, WP). In response to playback of a pre-recorded vocalisation of the species, the female several times approached us more closely but never sang in response. Because of the dense vegetation it proved impossible to acquire photographs, but all three observers are familiar with the species. The less likely Bamboo Antshrike *C. sanctaemariae* was excluded on the basis of the short crest and the extensively barred dull buff underparts. This sight record is apparently the first for Goiás and further emphasises the Amazonian element in the avifauna of the state's western boundary. Fasciated Antshrike was not mentioned for Goiás by Hidasi (1983, 2007) nor was it mapped for the state by Zimmer & Isler (2003), and the nearest record known to M. L. Isler (*in litt.* 2009) is that by Fry (1970) from the base camp at the Serra do Roncador, Mato Grosso (12°54'S, 51°52'W).

GLOSSY ANTSHRIKE *Sakesphorus luctuosus*

Precise southern range limits in the Araguaia Valley not entirely clear. *S. l. araguayae* (Hellmayr, 1908) was described from five adult males and five adult females, as well as a juvenile male from the rio Araguaia, which were said to differ on the basis of having much less white on the tail tips but broader white fringes to the scapulars. The type was collected at Aruanã, Goiás (14°54'S, 51°05'W; see LeCroy & Sloss 2000: 37, wherein the coordinates are incorrectly stated to be 05°21'S, 48°41'W). Our southernmost record of this taxon, which Zimmer & Isler (2003) stated might represent the end point in a cline, is from flooded forest on the left bank of the Araguaia, opposite Tacaiu, Goiás, on 5 July 2010 (GMK, WP), *c.*30 km south-west of Aruanã. Further south, e.g. around Barra do Garças, Mato Grosso / Aragarças, Goiás, we have yet to record this species, despite considerable field time. Ridgely & Tudor (2009) erroneously failed to map this species from the right bank of the Araguaia, i.e. from the states of Tocantins and Goiás, at all.

BLACK-BELLIED ANTWREN *Formicivora melanogaster*

Three species of *Formicivora* are present in the study region, *F. melanogaster* and the more numerous and widespread Rusty-backed *F. rufa* and White-fringed Antwrens *F. grisea*. Nonetheless, the range of the near-endemic *F. melanogaster* in the region of the Araguaia Valley has been under-estimated in much of the standard literature on Neotropical birds

(e.g. Ridgely & Tudor 1994, 2009, Zimmer & Isler 2003). Pacheco & Olmos (2006, 2010) already pointed to the presence of Black-bellied Antwren in the dry forests of eastern and south-east Tocantins (despite that Hidasi 1998 did not mention *F. melanogaster* for the state), and the species is also reasonably common in some dry forests of western Goiás, e.g. north of Registro do Araguaia (15°44'S, 51°50'W), which it shares with *F. grisea*. Our northernmost record on the east bank of the Araguaia is from dry forest between Caseara and Araguacema, Tocantins, on 11 September 2004 (GMK *et al.*), although to date without documentation. Black-bellied Antwren must be extremely local in this region, however, as Pinheiro & Dornas (2009a) failed to record it here, as did Lopes & Braz (2007) in central Tocantins.

BANANAL ANTBIRD *Cercomacra ferdinandi*

Several pairs tape-recorded in bamboo in flooded black-water lake edge and three-year old second growth, at Rancho Jatobá, on the west bank of rio das Mortes, 8 km north of Novo Santo Antônio, Mato Grosso, on 4 May 2004 (AW), while an adult male was photographed at Novo Santo Antônio on 15 March 2012 (R. E. F. Santos; WA 629525). These are perhaps the first published records for the state (Zimmer & Isler 2003), although there are two specimens at MZUSP (82694–695) from São Felix do Araguaia. Despite much playback in ideal habitat, we have never found this species on the west bank of Araguaia in Pará, although the species was recently found in the latter state, at Fazenda Fartura (Somenzari *et al.* 2011).

MANU ANTBIRD *Cercomacra manu*

A male was observed singing in response to playback of a pre-recorded vocalisation from Bolivia (Isler & Whitney 2002), in a woodlot dominated by tall bamboo within a matrix of partially degraded *cerrado*, agricultural fields and wooded areas at Fazenda São João II, 10 km north of Guaraí, Tocantins, on 7 January 2009 (GMK, JP, WP). It gave the same stereotyped song, more simple than that in Bolivia or, for instance at Cristalino Jungle Lodge, Alta Floresta, Mato Grosso (pers. obs.), as recorded by Beadle *et al.* (2004b). This is the same general area where the species was first found in Tocantins, by Beadle *et al.* (2004b), in February 2002. Subsequently, *C. manu* has also been found at a locality near Araguacema, on the right bank of the rio Araguaia, by J. F. Pacheco (pers. comm.), one was sound-recorded and collected at Araguaína (07°28'49.48"S, 48°27'27.46"W) in January 2010, a pair (of which the male was sound-recorded) in the municipality of Tupirama (08°52'9.17"S, 48°9'42.06"W) in April 2011 (Dornas *et al.* 2012) and a male was photographed at Dois Irmãos do Tocantins in October 2014 (A. Corrêa; WA1526965). It clearly should be searched elsewhere in the state with suitable patches of bamboo habitat. Even more remarkably, the species has recently been sound-recorded (the same 'simpler' song) in Maranhão, at Marajá do Sena, in February 2014 (E. Legal; WA1257858)

SPIX'S WARBLING ANTBIRD *Hypocnemis striata*

Not mapped east of the Araguaia by either Isler *et al.* (2007) or Ridgely & Tudor (2009), but mentioned for Tocantins by Hidasi (1998) and two specimens are available from Araguatins (Dornas & Pinheiro 2011). Seen and heard in tall, humid forest c.5 km south of Senhor do Bonfim, Tocantins (08°67'S, 49°41'W), on 5 January 2009 (GMK, JP, WP). All of the observers are extremely familiar with the species from elsewhere in eastern Amazonia, although no documentation was obtained. This is probably the second published record of *H. striata* for the state. Further south, neither Pinheiro & Dornas (2009a) nor we have recorded the species in the vicinity of the Parque Estadual do Cantão.

BLACK-THROATED ANTBIRD *Myrmophylax (Myrmeciza) atrothorax*

Pair tape-recorded and observed in gallery forest edge along the west bank of rio das Mortes, 8 km north of Novo Santo Antônio, Mato Grosso, on 5 May 2004 (AW). This record is the closest to the Tocantins border in eastern Mato Grosso, from where there are records at Canarana (April 2014: L. Nunes; WA 1301128) and Querência (May 2011: M. Moss; WA 359358).

RUFOUS-CAPPED ANTTHRUSH *Formicarius colma*

No records for Tocantins mentioned by Sick (1997) or mapped by Ridgely & Tudor (1994, 2009), but *F. colma* was mapped for the north-west of the state by Hidasi (1998) and a total of 13 specimens are available from two localities, Araguatins and Couto de Magalhães, in northern and western Tocantins (Dornas & Pinheiro 2011), while the species was also found at Presidente Kennedy by Raposo (2013). Not listed for areas further south, e.g. the Cantão region (Pinheiro & Dornas 2009a). One was observed in tall forest c.5 km south of Senhor do Bonfim, Tocantins (08°67'S, 49°41'W), on 5 January 2009 (photographed; GMK, JP, WP). The latter perhaps represents only the third specific published locality for the state.

COLLARED CRESCENTCHEST *Melanopareia torquata*

Reasonably common by voice in *cerrado* on the left bank of the rio Araguaia in the vicinity of Barreira do Campo, south-east Pará, on 25 and 27 January 2002, 2 January 2009 and 10 January 2013 (GMK *et al.*). Stated to occur from southern Pará southwards by Krabbe & Schulenberg (2003), but Aleixo & Poletto (2007) were aware of just two previously published localities in the state, in the Serra do Cachimbo (Pacheco & Olmos 2005, De Luca *et al.* 2009, Santos *et al.* 2011; AW pers. obs.) and at Gorotire. Given that *M. torquata* appears to be relatively widespread and common in *cerrados* across the state of Tocantins (Hidasi 1998, Pacheco & Olmos 2006, 2010, Pinheiro & Dornas 2009a; pers. obs.), its presence in immediately adjacent parts of Pará is undoubtedly unsurprising.

AMAZONIAN INEZIA *Inezia subflava*

Observed on river islands in the rio Araguaia, and in low scrubby vegetation that is seasonally inundated on the right bank of the same river, immediately north of Caseara, Tocantins, where the species is common and was photographed by WP, on 26 January 2002, 11 September 2004, 1–2 January 2009, 16 November 2011, and 9 and 11 January 2013 (GMK *et al.*; Fig. 5). KJZ & AW recorded single pairs at Caseara on 22 and 24 August 2002, two pairs along the rio do Coco on 24 August 2002 (KJZ tape recordings; video), five on a river island upstream of Caseara, and 3+ along the rio do Coco near Caseara on 26 August 2002. The species had already been mentioned for the Parque Estadual do Cantão, Tocantins, by Buzzetti (2004) and Pinheiro & Dornas (2009a). In their partial revision of the genus *Inezia*, Zimmer & Whittaker (2000) knew of documented records, involving either specimens or tape-recordings from as far east as the rio Tocantins, only above its confluence with the rio Araguaia, although Dornas & Pinheiro (2011) mentioned four specimens from Araguatins (again, Hidasi 1998 included the species in the state's avifauna). To date, the species' occurrence on river islands in the rio Teles Pires, near Alta Floresta (Zimmer *et al.* 1997; pers. obs.), is the southernmost published from Brazil.

CHAPADA FLYCATCHER *Suiriri affinis* / **CAMPO SUIRIRI** *S. suiriri burmeisteri*

Both *Suiriri* were fairly common in *cerrado* (locally known as *varjão*) along the rio das Mortes, 8 km north of Novo Santo Antônio, Mato Grosso, in early May 2004 (AW). There is a subsequent record from this region, at São Félix do Araguaia, in December 2008 (B. W.

Davis; WA 11217). A displaying pair of Campo Suiriri was tape-recorded in *cerrado* on the left bank of the rio Araguaia near Barreira do Campo, Pará, on 25 August 2002 (KJZ & AW; KJZ videotape). Single displaying pairs of Chapada Flycatcher were observed and tape-recorded in roadside *cerrado* c.25–30 km east of Caseara, and 65 km east of Caseara, where the two *Suiriri* were sympatric, on 18 August 2004 (AW), as well as at Fazenda São João II, 10 km north of Guaraí, Tocantins, on 7 January 2009 (GMK, JP, WP). The nomenclature of this genus has recently been revised (Kirwan *et al.* 2014b).

SPOTTED TODY-FLYCATCHER *Todirostrum maculatum*

Observed daily, and photographed by WP, in a wooded garden at Araguacema, Tocantins (08°80'S, 49°55'W), on the right bank of the rio Araguaia, on 4–6 January 2009 (GMK, JP, WP; Fig. 6). Also observed on a river island in the rio Araguaia, just north of Caseara, Tocantins, on 26 January 2002 (GMK *et al.*) and on a river island in the rio Araguaia just south of Caseara, as well as along the rio do Coco (10+ in seasonally flooded scrub and forest borders), near Caseara (KJZ tape-recording; video), on 22–26 August 2002 (AW, KJZ). Not listed or mapped for Tocantins by Sick (1997) or Walther (2004a), although Ridgely & Tudor (1994) mentioned occurrence in northern Goiás (which can be taken to refer to Tocantins, as these authors did not recognise the latter state, which was formed only in 1988, as a separate unit). *T. maculatum* is mentioned for Tocantins by Hidasí (1998), albeit without details or even a map of its range there, and seven specimens are available from Araguatins (Dornas & Pinheiro 2011). The photograph published here (Fig. 5) represents additional documentation for its occurrence in Tocantins, but the species was found at many localities within the Parque Estadual do Cantão by Buzzetti (2004) and Pinheiro & Dornas (2009a), and it is presumably reasonably common in suitable forests in north-west Tocantins.

SMOKY-FRONTED TODY-FLYCATCHER *Poecilotriccus fumifrons*

Of curiously disjunct distribution in Brazil, with populations in the far north-east littoral; from Belém at the mouth of the Amazon south as far as the upper rio Xingu in north-east Mato Grosso (Fry 1970, Ridgely & Tudor 1994, Sick 1997, Walther 2004b); and north of the Amazon as far west as Manaus (Cohn-Haft *et al.* 1997, Ridgely & Tudor 2009). It does not appear to have been previously mentioned for Goiás (Hidasí 2007), where one was carefully identified at Chapéu da Palha, north-west of São Miguel do Araguaia, on the right bank of the rio Araguaia, on 9 July 2010 (GMK, WP). It was separated from the fundamentally similar Rusty-fronted Tody-Flycatcher *P. latirostris*, which was found at various localities further south in the Araguaia Valley, by virtue of its much paler lores, yellower wingbars, lack of any rusty-buff coloration on the forehead and pale yellowish posterior underparts (see, for instance, Ridgely & Tudor 2009). Further north, however, both *P. fumifrons* and *P. latirostris* occur in sympatry in the region of the Ilha do Bananal at least (Pinheiro & Dornas 2009a; GMK pers. obs.).

SHORT-TAILED PYGMY TYRANT *Myornis ecaudatus*

Pair tape-recorded and observed in tall gallery forest at the edge of a lake along the west bank of the rio das Mortes, 8 km north of Novo Santo Antônio, Mato Grosso, on 6 May 2004 (AW). In northern Mato Grosso, previously known from the upper rio Xingu (Sick 1997) and regarded as extremely rare in Parque Estadual do Cantão, Tocantins (Buzzetti 2004), thus our record fills a gap between these two localities.

ZIMMER'S TODY-TYRANT *Hemitriccus minimus*

Scattered singles observed and tape-recorded beside the right bank of the rio Araguaia and along the rio do Coco, just upstream from Caseara, on 23–26 August 2002 (KJZ & AW), with one in the same general area on 5 January 2009 (GMK *et al.*). At the time, the 2002 observations represented a significant range extension, although the species has since proven to be comparatively widespread in southern Amazonia (*cf.* Whittaker 2004) and it has been found even further east in Tocantins, at Pium, by C. Albano (WA 412173) and M. A. Crozariol (WA 165180). Nevertheless, the species was not mapped for Tocantins by Gwynne *et al.* (2010), despite that its presence in Parque Estadual do Cantão had already been reported (Pinheiro & Dornas 2009b).

RIVERSIDE TYRANT *Knipolegus orenocensis*

Riverside Tyrant, as currently treated, is a polytypic species consisting of three disjunctly distributed subspecies, each restricted to different river basins: nominate *orenocensis* (rio Orinoco and rio Apure in Colombia and Venezuela); *sclateri* (rio Napo and Amazon, from Ecuador east to the lower rio Tapajós in Brazil); and *xinguensis* (lower rio Xingu and the rio Araguaia in eastern Brazil). Previous authors (Ridgely & Tudor 1994, Farnsworth & Langham 2004) have speculated that *K. orenocensis*, *sensu lato*, may comprise more than one species, with such speculation focused primarily on Amazonian *sclateri*, which exhibits more pronounced sexual dimorphism in plumage than is found in the other two subspecies. Ridgely & Tudor (1994) stated: 'We would favor treating *K. sclateri* and *K. orenocensis* as separate species...but for the problem of the *xinguensis* taxon. It seems more to resemble *orenocensis*, though its range is highly disjunct from that form. Until more is known of the complex, we consider it prudent to retain the usual single-species treatment.' A decade later, Farnsworth & Langham (2004) assessed the situation thus: 'Race *sclateri* possibly a separate species, exhibits marked sexual plumage dimorphism whereas nominate and *xinguensis* do not; insufficient information currently available to enable full assessment of taxonomy.' After yet another ten years, we still lack data to fully assess species limits within *K. orenocensis*. In light of this, we take this opportunity to present our observations, made along the rio Araguaia, of the subspecies *xinguensis*.

Morphological variation within the genus *Knipolegus* has been evolutionarily conservative, particularly with respect to plumage pattern in males, which, for all but one of the 12 currently recognised species in the genus, is almost uniformly black or some shade of dark grey, with or without concealed or semi-concealed patches of white in the wings. Most *Knipolegus* exhibit greater interspecific variation in the female plumage than in that of males. Ridgely & Tudor (1994) offered little in the way of plumage distinctions between nominate *K. orenocensis* and *K. o. xinguensis*, and compared the latter to the former stating: 'Both sexes ... are uniform slaty gray, the female slightly paler and more olive.' Farnsworth & Langham (2004) offered that males of nominate *orenocensis* are 'uniform slate-gray or blackish-gray' with 'iris dark; bill thickish, pale blue-gray, black tip; legs black.' They described the nominate female as 'slightly paler than male, slate gray with olive tinge'; whereas they described subspecies *xinguensis* as 'very like nominate, but slightly larger, female somewhat paler.' In contrast, KJZ & AW found *xinguensis* to exhibit a greater degree of sexual dimorphism in plumage than indicated in the literature. The following is transcribed from field notes dictated by KJZ on microcassette on 23 August 2002, when we recorded 10+ individuals of *K. o. xinguensis* during surveys of four different river islands in the rio Araguaia, upstream of Caseara: 'Male is dark, smoky grey all over, darker about the head and face, and slightly paler on the belly; at very close range, fine, dusky (darker) streaking is visible on the throat; bill is pale blue-grey with a dusky tip; irides are dark

brown; legs and feet are black. Female is paler, ashier gray all over, with broad, buffy throat streaking similar to that found in female Velvety Black-Tyrant *K. nigerrimus*, but with throat streaks buffy, not rufous; has some buffy wash to the undertail-coverts and lower flanks as well.'

Stereotypical male display behaviours have been described for six of the 12 currently recognised species of *Knipolegus* (Ridgely & Tudor 1994, Hilty 2002, Farnsworth & Langham 2004). Many of these displays involve a well-spaced series of short sallies or jumps from a perch, with accompanying soft vocalisations and mechanical noises produced by the wings, but the species differ not only in the sounds they produce, but in various aspects of the physical display, including distance and direction of the display sallies, perch orientation prior to and after each display, between-display intervals and whether the bird returns to the same perch or a different one at the end of each display (cf. Farnsworth & Langham 2004). The only detailed published description of the display of Riverside Tyrant (Ridgely & Tudor 1994) pertains to those performed by the Amazonian subspecies *K. o. sclateri*: 'Male *sclateri* have a display in which every 10–15 seconds they quickly mount a few meters into the air, then drop back down, accompanied by a (mechanical?) snap.' In the early morning of 7 November 2012, opposite Sani community, on a young river island in the río Napo, prov. Napo, Ecuador, GMK periodically observed a male *sclateri* performing such a display within a dense patch of c.3 m-tall *Gymnerium* cane with a handful of marginally taller young *Cecropia* trees. Unfortunately, the extremely dense nature of the habitat meant that not all of the displays could be observed, but each upward sally was made at intervals of no more than one minute, from a horizontal perch c.75 cm above the ground and to a height of no more than 4 m above the ground (but usually less than that of the *Gynerium* cane). Nothing detailed is available for nominate *orenocensis*, other than a note that 'display in Venezuela comprises sheer vertical flight after vocalising, usually from scrub and returns to same perch', while calls are described as being a 'very soft *tsik-tsik*, followed by an explosive *tschue-up!* while displaying in air' (D. Ascanio in Restall et al. 2006).

Given the low level of interspecific plumage diversification within the genus, it appears probable that differences in these stereotypical displays (and in the accompanying vocalisations and mechanical sounds produced therein) would reflect underlying genetic differences, in addition to acting as primary isolating mechanisms in the event of contact between taxa. As such, differences in the display behaviours and sounds between the three subspecies of Riverside Tyrant (*orenocensis*, *sclateri* and *xinguensis*) could prove informative in assessing species limits within the complex. With this in mind, we present what we believe to be the first published observations on the display behaviour of *K. o. xinguensis*, made along the rio Araguaia, just upstream of Caseara, Tocantins. On 23 August 2002, KJZ & AW spent considerable time observing and videotaping the display of a male *K. o. xinguensis*. The following description is transcribed from KJZ's microcassette notes, which were dictated both during and immediately after the period of observation.

'Male displays from a perch below the canopy (c.10–12 m tall) in the shaded understorey. Seems to prefer horizontal or thick diagonal, open limbs from which to display. Most common display involves a sudden jump-and-flip, in which the bird changes his orientation on the same perch by 180°, while vocalising with soft *pip pip* notes. While delivering the *pip* notes, the bird makes a shallow dip of the tail, but between notes, he flicks the tail up very abruptly over a c.60° arc, and that movement is usually accompanied by another flip and 180° change of orientation on the perch. Occasionally gives more abrupt, excited-sounding *pip* notes, followed by a hiccupping, buzzy *burrzzip*, during which there is a distinct upward spasm of the head (caught on video). Periodically, the male performs an aerial display. The first to be observed was initiated from a fairly open, sunlit perch c.2

m below the canopy, and he shot very quickly up through the canopy to a height of c.5–6 m, and at the apex of the flight, snapped the wings high above the back in a dihedral, making a distinct snapping sound, and then folded the wings and came zooming right back down to the same perch. KJZ saw similar displays performed three times from below the canopy: the first was a diagonal sally of c.3 m from the perch, giving the song in flight, but without the wing-snap at the apex, and just returning to the perch. Another time the male went only c.1 m above his perch, and again, gave the hiccupped song in flight, but without the wing-snap, before returning to the perch. The final display flight that KJZ witnessed was barely 30–50 cm above the perch, but the bird snapped his wings in a high dihedral, so that they met above his back, and then returned to the same perch.'

DORADITO SP. *Pseudocolypteryx* sp.

On 24 August 2002, on a river island in the rio Araguaia just upstream from Caseara, Tocantins, AW & KJZ made observations of a doradito that could not be certainly identified to species. The bird foraged in a densely vegetated marshy depression, occasionally appearing on top of the vegetation for a few seconds before disappearing from view into the rank growth. They watched it on and off for c.15–20 minutes before losing it entirely. The bird most closely resembled Subtropical Doradito *P. acutipennis* in that it was entirely olive above and bright yellow below, with olive cheeks, dusker lores, faint wingbars, a pinkish-based mandible and blackish legs and feet. In plumage (but not in build or posture) it was suggestive of female Masked Yellowthroat *Geothlypis aequinoctialis*, except for the presence of faint wingbars and the lack of any suggestion of a pale supercilium or eye-crescents. Another was photographed by AW on 21 August 2004; this bird lacked a dark mask, had a pink lower mandible and apparently a buff area above and below the eye. If confirmed as *P. acutipennis*, these would be marginally the northernmost in Brazil of the species, which has previously been recorded in coastal Paraná, in southern Rondônia in June 2003 and July 2002 (Whittaker 2004), at two localities in Mato Grosso do Sul, in September 2005, May 2006 and probably September 2007 (Vasconcelos *et al.* 2008), and most remarkably a bird trapped and photographed in Parque Estadual do Cantão, Tocantins, on 21 September 1999, by D. Buzzetti (Minns *et al.* 2009), which bird closely recalls that photographed by AW in August 2004.

WHITE-NAPED XENOPSARIS *Xenopsaris albinucha*

A presumed female, based on the brownish tone to the cap and some remiges, was observed foraging c.1 m above ground in low bushy vegetation directly abutting the shore of a river island in the rio Araguaia just north of Caseara, Tocantins, on 11 September 2004 (GMK *et al.*). Other observations in successional growth on river islands just south of Caseara include two birds thought to be juveniles (crown black, mottled or scaled rufous, base of mandible pinkish, remiges broadly pale-edged and wing coverts neatly buff-edged) on 26 August 2002 (AW, KJZ; videotaped by KJZ) and a female on 20 August 2004 (AW). KJZ & AW also observed one (thought to be an adult male) on the left bank of the rio Araguaia in Pará, opposite Caseara, on 25 August 2002. Buzzetti (2004) had three records in the nearby Parque Estadual do Cantão, two in August and one in January, but it was not recorded by Pinheiro & Dornas (2009a). Slightly further south, a presumed male was observed in a dry-forest remnant with extensive bamboo at Rancho Isadora, just west of Lagoa da Confusão, Tocantins, on 10 July 2010 (GMK, WP). Mobley (2004) mentioned that the species is frequently found close to water, although it is also a typical inhabitant of the dry *caatingas* and *cerrados* of the Brazilian north-east (Sick 1997, Pereira *et al.* 2008; pers. obs.), where AW & KJZ have found several nests in spiny caatinga trees, but river islands do not seem to

have been noted as habitat of the species in previous literature. *Xenopsaris* is not mentioned for Tocantins by the standard works (Ridgely & Tudor 1994, Sick 1997, Mobley 2004), but was included in the state's avifauna by Hidasí (1998). Subsequently, Raposo (2013) and, especially, Pacheco & Olmos (2010) enumerated several other recent records in the state, as well as from Maranhão, and it has recently been found in the Alta Floresta region of northern Mato Grosso (Zimmer *et al.* 1997). Elsewhere in south-east Amazonia, listed for the Serra dos Carajás, Pará (Pacheco *et al.* 2007), based on a single record, of a male in a *canga* formation, on 3 September 2005 (GMK *et al.* pers. obs.). Zeppilli *et al.* (2006) briefly discussed the possibility that *Xenopsaris* might undertake seasonal movements, and Chesser (1997) considered the species an austral migrant in Bolivia and probably in adjacent Mato Grosso, Brazil; it remains to be seen whether birds in Maranhão, Pará and Tocantins are resident or not.

VÁRZEA SCHIFFORNIS *Schiffornis major*

The characteristic voice of this Amazonian species was heard in mature riverine gallery forest near Caseara, Tocantins, on 20 August 2004 (AW). The first record for Tocantins, this species' precise range in eastern Amazonia is still poorly known, though definitive records in the Tapajós–Xingu interfluvium appear to be lacking (Kirwan & Green 2011).

VEERY *Catharus fuscescens*

A single was observed feeding on small melastome fruits, in gallery woodland beside a stream through pristine *cerrado* in Emas National Park, Goiás, on 22 December 2008 (GMK, JP, WP). Several other bird species, including various tanagers (Thraupidae), were also attracted to the same fruiting tree (18°27'S, 52°81'W). The Veery tended to visit the tree only in the absence of other birds, and during the intervening periods it perched quietly and often motionless at low levels in nearby trees and bushes. It never vocalised, but WP obtained photographs of the bird (Fig. 7). Remsen (2001), in discussing the winter range of the Veery, knew of no true winter records (i.e. between 2 December and 20 February) for Goiás, although he mentioned an unpublished record of two that were trapped at an unstated locality just outside this period. In contrast, Hidasí (2007) did not mention the species' presence in the state at all. Given the relative paucity of documented records of this species in South America, and the chronic confusion that has surrounded knowledge of its temporal status and distribution on the continent (Remsen 2001), it is pertinent to mention two other records here. J. C. Minns (pers. comm.) observed one in primary *terra firme* at c.700 m in the Serra dos Carajás, Pará, on 29 January 2002, thereby providing additional evidence of its presence in winter at this locality. GMK observed another Veery in seasonally inundated gallery forest alongside the rio Cuiabá, at the Reserva Particular do Patrimônio Natural do SESC Pantanal (16°39'S, 56°16'W), near Porto Cercado, south-west Mato Grosso, on 2 November 2006, providing the first record for the Pantanal wetland (Tubelis & Tomas 2003). Whether this bird was already on its wintering grounds, or was still en route to areas further south is, of course, unknown, but for the nearby Chapada dos Guiramães Lopes *et al.* (2009) assembled considerable evidence for its winter presence. Alteff *et al.* (2009) recently trapped the species in mid November in the nearby Serra das Araras, Mato Grosso. Tobias & Seddon (2007) speculated that the species might be confirmed to winter in northern Bolivia in significant numbers.

CLIFF SWALLOW *Petrochelidon pyrrhonota*

In early November 2007, AW observed up to 10,000+ Cliff Swallows in Emas National Park, south-west Goiás, with daily maxima ranging from 50 to 2,000+ on 24–31 October

2005 (AW, KJZ), and 2,000 on 1–5 November 2009 (AW). Some of these birds were perhaps still on migration. However, on 23 December 2008, starting *c.*90 minutes before dusk, in excess of 3,000 Cliff Swallows were estimated moving over *cerrado* in the national park and surrounding agricultural fields, apparently towards an unknown roost site somewhere south-east of the national park (GMK, JP, WP). Much smaller numbers (<10 per day) were recorded over the following three days, at this site, as well as at the rio Babilônia east of Alto Araguaia, Goiás, and at Perolândia, Goiás (GMK, JP, WP). Large numbers of Cliff Swallows have recently been recorded on migration in south-west Minas Gerais and at Emas National Park (*cf.* Vasconcelos *et al.* 2006), but the species was not previously suspected to winter in this region of Brazil (e.g. Paynter 1995, Sick 1997) except by general reference works without apparent evidence (Turner 2004). Hidasi (2007) did not list Cliff Swallow for Goiás.

GREY-CHESTED GREENLET *Hylophilus semicinereus*

One observed and tape-recorded in mature riverine gallery forest near Caseara, Tocantins, on 20 August 2004 (AW). Recently found nearby in the Parque Estadual do Cantão (Buzzetti 2004), Dornas & Pinheiro (2011) mentioned a specimen (MZUSP 52918) from Araguatins; the species' southernmost limit in the Tocantins–Araguaia interfluvium is presumably in the northern Bananal.

CONE-BILLED TANAGER *Conothraupis mesoleuca*

This recently rediscovered and Critically Endangered species was observed in wet gallery forest along the rio Formoso, in Emas National Park, Goiás, on 25–28 October 2005 (an apparently mated pair plus a second male on 25 and 28 August, and what was believed to be an immature male at a second site on 27 August; AW, KJZ), 3–7 November (three males and an apparent pair; AW) and 22–23 December 2008 (pair; GMK, JP, WP). Following its initial discovery in August 1938 at Juruena, 'north-east' of Cuiabá, Mato Grosso, by J. A. Vellard, who collected the male holotype (Berlioz 1939), *C. mesoleuca* disappeared from the ornithological 'radar' until 2003, when it was found in Emas, although confirmation did not come until October 2004 (Buzzetti & Carlos 2005). Subsequently, in September 2006, an apparently substantial population of the species was discovered along the upper rio Juruena, in the Chapada dos Parecis, western Mato Grosso (P. Develey *in* BirdLife International 2008, Candia-Gallardo *et al.* 2010), remarkably close to where J. F. Pacheco (*in* Sick 1997) had considered the whereabouts of Vellard's 'Juruena' to be, which he had speculated to be the headwaters of the rio Juruena, in the Chapada dos Parecis, *c.*400 km north-west of Cuiabá. Recently, the detective work of Candia-Gallardo *et al.* (2010) has confirmed that Vellard really was in this region at the time the type specimen was collected. Other than the latter contribution, remarkably little has been published on the habits and ecology of Cone-billed Tanager since its rediscovery, prompting the remarks here.

GMK *et al.* found a pair of *C. mesoleuca* in the same, relatively small, patch of dense gallery forest with a canopy height of *c.*10 m, and some emergents (mainly *Mauritia* palms) reaching 15+ m, on the north bank of the rio Formoso, on both days of field work in December 2008. The forest at this season was by now extensively inundated, with much standing water >5 cm deep in places. Candia-Gallardo *et al.* (2010) already noted a strong preference for such habitats during their surveys of the upper rio Juruena. We have searched apparently similar habitats in parts of the Araguaia Valley using playback, to date without success. Dense seeding bamboo, up to 3–4 m tall, was present virtually throughout the forest patch. The pair was initially located using playback, whereupon the previously unseen male of the pair appeared virtually instantaneously, within *c.*60 seconds of initiating the broadcast. But only after *c.*5 minutes of the song being first broadcast did the male (Fig.



Figure 7. Veery *Catharus fuscescens*, Emas National Park, Goiás, December 2008 (© W. Price)

Figure 8. Male Cone-billed Tanager *Conothraupis mesoleuca*, Emas National Park, Goiás, December 2008 (© W. Price)

Figure 9. Female Cone-billed Tanager *Conothraupis mesoleuca*, Emas National Park, Goiás, December 2008 (© W. Price)

Figure 10. Type specimen (FMNH 75034) of Blue-necked Tanager *Tangara cyanicollis albotibialis*, Veadeiros (= Alto Paraíso de Goiás), northern Goiás, collected on 9 December 1929 by J. Blaser (Mary Hennen / © Field Museum of Natural History, Chicago)

8) sing in response and then only relatively briefly and weakly. In contrast, the female (Fig. 9), which was only seen some time later, never approached the recording during our observations, unlike the male, which consistently responded to playback, albeit much more weakly after the initial response on both mornings in the area. AW & KJZ have observed female-plumaged birds (possibly including young males) exhibiting weaker response to playback, only responding after 2–3 minutes, always with a single, harsh, loud *chip* note (most reminiscent of Ultramarine Grosbeak *Cyanocopsa brissonii*), given at intervals of just *c.*1 minute. In response to playback, they observed one male making exaggerated tail side-to-side switching, and wiping its bill on a branch. Candia-Gallardo *et al.* (2010) reported similar sexual differences in response to playback. Although these latter authors also provided a description and photograph of the female, we consider it worthwhile to present another image of this plumage because the individual encountered by GMK *et al.* was clearly more rufescent, especially on the upperparts, than the bird collected by Candia-Gallardo *et al.* (2010).

Each song phrase lasts *c.*3.5 seconds and consists of an abrupt burst of notes, commencing with a handful of more scratchy and less resonant ones, before becoming more rhythmical, strident and culminating in several more melodic notes, the last one generally the loudest and most powerful of the entire phrase. Occasionally several phrases are given in rapid sequence. In the morning of 3 November 2007, in response to playback, AW observed a male approach and land in the uppermost branches of an Annonaceae, from where it performed a long display flight (lasting 30–45 seconds and covering *c.*100 m) while singing, initially with exaggerated wing flapping to gain height at a *c.*35° angle. Following the course of the gallery forest, while flying away from AW, until it was 7–10 m above the canopy, it gradually descended into a tree crown, from where it sporadically sang. What was judged to be an immature male (female-plumaged, but with a distinctly paler bill) was observed by KJZ & AW on 27 November 2005 to make repeated display flights, in full song, high above the canopy of the *brejo* within Emas National Park. In the morning of 6 November 2007, while AW was observing a pair in gallery forest scrub, another adult male appeared and the two males chased each other in flight over the bushes and into the taller forest, where they were lost to view. Both members of the apparent pair in December 2008, which were frequently seen in close proximity and maintained contact using single, simple notes similar to those given by the male in song, were faithful to the same area of forest, of *c.*100 m × 30 m, and although they occasionally appeared to depart the area they soon returned. Sonograms were already presented by Candia-Gallardo *et al.* (2010).

In December 2008, the birds mostly foraged in the midstorey, apparently solely on bamboo seeds in the manner of one of the specialist forest-based *Sporophila* seedeaters, such as Buffy-fronted Seedeater *S. frontalis*, or a Plushcap *Catamblyrhynchus diadema*, by perching close to the top of bamboo stalk, grasping the seed head in the bill and consuming it while still on the stalk. They would occasionally remain feeding on the same stalk of bamboo for some minutes. Candia-Gallardo *et al.* (2010) also reported *C. mesoleuca* feeding on bamboo seeds in the manner of a *Sporophila*, but also noted the species feeding on exotic grasses and catching insects in flight, while AW & KJZ have noted individuals with mud on their bills, suggesting that they had been feeding on the ground, as well as seeing birds foraging within 15 cm of the forest floor. Further observations are required to determine their ecological significance, specifically to establish whether *C. mesoleuca* is either seasonally or more strongly dependent on bamboo.

The only other member of the genus *Conothraupis*, the similarly plumaged Black-and-white Tanager *C. speculigera*, is known as a breeder only from south-west Ecuador and north-west Peru, with numbers apparently greater after good rains, and perhaps solely as

a very local non-breeding visitor to the west Amazonian basin in south-east Ecuador and eastern Peru (Isler & Isler 1999, Ridgely & Greenfield 2001, Schulenberg *et al.* 2007), with two specimen records from Acre, Brazil (Stotz 1990, Whittaker & Oren 1999), and a sight record from La Paz, Bolivia (Parker *et al.* 1991). All dated records east of the Andes are from the period April–September, except a recent (and extraordinary) photo-documented record from French Guiana in March (Claessens *et al.* 2012), and none from Amazonian Ecuador or Peru is earlier than June. There is also an October 1969 specimen from dpto. Putumayo in south-east Colombia, which has only recently come to light (Lobo-y-Henriques *et al.* 2012). Specific nesting records are dated March–April, but the season almost certainly extends into May (Isler & Isler 1999, Greeney *et al.* 2006, Ingels 2007). BirdLife International (2008), who classify the species as Near Threatened, repeated Isler & Isler's (1999) speculation as whether there might not be separate trans-Andean populations. It is plain that *C. speculigera* too is a highly aberrant member of the Thraupidae; the species' apparently strongly migratory habits, 'strange' song (frequently reported as being icterid-like; *cf.* Coopmans *et al.* 2004), unusually large clutch size, and some behavioural characters (forming single-species flocks, foraging in the understorey or in weeds, flushing en masse into higher strata) are all suggestive of the bird having been misclassified, and the same might prove true of *C. mesoleuca*.

In January 2001, KJZ observed and tape-recorded multiple male Black-and-white Tanagers north of Olmos, dpto. Lambayeque, Peru. These tanagers appeared to be stimulated by recent rains and were persistently vocal throughout the morning. The only vocalisation heard or tape-recorded was a series of short, hollow whistles, with an odd, ringing quality, which was both far-carrying and yet ventriloquial and somewhat difficult to pinpoint to location. These were typically delivered as paired notes, separated by c.0.5 seconds, usually with the first note louder and higher pitched, the second note sounding softer and further away (*kowng keowng*). Gaps between couplets were perhaps two seconds, or, at least twice the gap between the two notes comprising the couplet. Birds delivered these songs / calls from atop low shrubs, and the vocalisation seemed to be in advertisement. As noted above, some observers have described the songs of *C. speculigera* as 'icterid-like', but KJZ thought the quality of the individual notes reminiscent of some calls of Golden-browed Chlorophonia *Chlorophonia callophrys* of Central America. KJZ observed and videotaped one male Black-and-white Tanager that sang from a shrub for several minutes. It partially drooped its wings, while flaring the white coverts at the wing-bend. More noteworthy, this individual appeared to have a semi-concealed, white coronal patch, which the bird exposed as it erected and briefly flared its crown feathers with each song couplet. Nothing in the rather sparse literature on the species mentions any such coronal patch. Neither the vocalisations nor the behaviours associated with them are even remotely reminiscent of those of Cone-billed Tanager (KJZ pers. obs.)

Most recently, Ridgely & Tudor (2009) returned *C. mesoleuca* to *Rhynchothraupis*, the genus in which it was originally described (Berlioz 1939), while noting the possibility that it is most closely related to the monotypic White-naped Seedeater *Dolospingus fringilloides*. Robbins *et al.* (2005) had already considered the relationships of the latter species, using molecular and other techniques, but despite finding strong support for its close relationship to both *Sporophila* and *Oryzoborus* had been unable to resolve whether to recognise one genus or three. These authors did not consider the possibility of a relationship between *Dolospingus* and either species usually included within *Conothraupis*. Storer (1960) long ago postulated the possibility that *C. mesoleuca* is an emberizid, rather than a Thraupidae. We concur with the assertion by Candia-Gallardo *et al.* (2010) that Cone-billed Tanager and *Dolospingus* share several similarities and might yet prove to be closely related, perhaps

even congeneric, and would also add voice to the list of those characters that appear to suggest a close relationship between them. In comparison to *C. speculigera*, the song of *mesoleuca* is obviously more complex and 'rambling' but both species possess some strident, icterid-like notes and are somewhat stereotypical. Furthermore, AW has observed a similar display flight as described above by a male *Dolospingus*, at Presidente Figueiredo, also while singing and landing in an emergent tree 50 m distant from the bird's starting point.

Despite the important clarifications proffered by Candia-Gallardo *et al.* (2010), it bears repetition that the type specimen of *C. mesoleuca* was supposedly obtained in dry forest, which suggests a habitat quite unlike that at Emas and those areas where it has been found in the upper rio Juruena drainage, perhaps indicating that it too makes seasonal movements? In a similar vein, Candia-Gallardo *et al.* (2010: 157) considered that *C. mesoleuca* might possess 'nomadic tendencies'.

BLUE-NECKED TANAGER *Tangara cyanicollis*

Principally distributed through the Andean foothills, from north-west Venezuela to western Bolivia, but distinctly uncommon in Brazil, where *T. cyanicollis* ranges across south-east Amazonian Brazil (Ridgely & Tudor 2009). Of the seven subspecies, the Brazilian endemic *T. c. albotibialis* is extremely poorly known. It was described from Veadeiros (= Alto Paraíso de Goiás), northern Goiás (14°07'S, 47°31'W: Traylor 1950), based on a female specimen, collected on 9 December 1929 by J. Blaser, and held in the Field Museum of Natural History, Chicago (FMNH 75034; Fig. 10). There are recent reports, unidentified to subspecies, from two localities in the region of Pedro Afonso, north-central Tocantins (at 08°25'S, 48°06'W and 08°24'S, 48°04'W: Lopes & Braz 2007) and the Serra do Lajeado (10°09'S, 48°14'W), slightly further south (Bagno & Abreu 2001), which might pertain to this taxon. Unfortunately, the subspecific identity of a specimen from Araguaatins (Dornas & Pinheiro 2011) is apparently unknown, and it was not found during a recent visit to the collection concerned (the Museu de Ornitologia de Goiânia). A second subspecies is relevant to our discussion here, namely *T. c. melanogaster*, which ranges as far east as the left bank of the Araguaia, e.g. at Conceição do Araguaia, Pará (08°15'S, 49°17'W), and from southern Pará south to north-eastern Bolivia (Marantz & Remsen 1994, Dickinson 2003). Despite this comparatively wide range published localities are rather few: these include Utiariti, near Salto Bello (type locality), on the rio Papagaio (13°02'S, 58°17'W), the rio Doze do Outubro, a tributary of the upper rio Juruena (12°22'S, 59°08'W: Cherrie & Reichenberger 1923), Tapirapuã on the rio Sepotuba (14°51'S, 57°45'W: Pinto 1944), Fazenda Tanguro, Querência (12°54'S, 52°22'W: Poletto *et al.* 2009), Rio Cristalino Jungle Lodge, Alta Floresta (Zimmer *et al.* 1997; pers. obs.), all in Mato Grosso, the Serra do Cachimbo (Sick 1957b, Pacheco & Olmos 2005; J. Hidasi specimens in MNRJ), Fazenda Fartura (Somenzari *et al.* 2011) and Serra dos Carajás (c.06°00'S, 50°30'W: Pacheco *et al.* 2007), all in Pará (the latter probably the northernmost locality), and from five localities in the Serranía de Huanchaca, dpto. Santo Cruz, Bolivia (Marantz & Remsen 1994). In addition, H. Sick (specimens in MNRJ) collected this species in Mato Grosso within the upper Xingu drainage, at Jacaré (12°00'S, 53°24'W) and Diauarum (11°12'S, 53°14'W), and at Pindaiba (14°58'S, 52°19'W) and Chavantina (14°40'S, 52°21'W), both on the upper rio das Mortes. AW (unpubl.) has found *T. cyanicollis* in the Parque Indígena do Xingu, also in northern Mato Grosso. The two races are not easily separated in brief views in the forest shade, but *T. c. albotibialis* has the belly blue (black in *T. c. melanogaster*), as well as the white thighs which give rise to its subspecific name. Other than the latter character, it most closely resembles the race *T. c. granadensis* of Colombia. We have records, also unattributed to subspecies, from four new localities in the northern Araguaia Valley, as follows. A pair was in tall gallery forest along the rio Coco, south of Marianópolis do Tocantins, Tocantins,

on 2 August 2009 (AW), at least two were in tall forest c.5 km south of Senhor do Bonfim, Tocantins, on 5 January 2009, and another was seen in a small patch of taller, more humid forest surrounded by degraded *cerrado* 10 km north of Guaraí, Tocantins, on 7 January 2009 (GMK, JP, WP). We also found the species just south of Conceição do Araguaia on 10 September 2004 (GMK *et al.*).

SCARLET-THROATED TANAGER *Compsothraupis loricata*

Small numbers in riverine forest on both banks of the rio das Mortes, around Novo Santo Antônio, Mato Grosso, where it was typically one of the first birds to sing pre-dawn in willows close to the river, with the largest flock of eight birds including several males, in early May 2004 (AW). Two adult males photographed (Fig. 11) at Barreira do Campo, Pará, on 7 January 2013 (GMK, HS). These are the first state records for this ‘odd’ ‘tanager’, which appears to be rather nomadic in north-east Brazil. There is a subsequent record from Mato Grosso, also from Novo Santo Antônio, in March 2012 (R. E. F. Santos; WA 11551). Although classified within the Thraupidae, it is probably better placed elsewhere, possibly within the Icteridae (Jaramillo & Burke 1999). Its highly unusual displays, with males revealing the white bases to the back feathers, combined with its breeding behaviour—utilising old woodpecker holes or hollow palms, and sometimes taking over the nests of Caatinga Cachalotes *Pseudoseisura cristata* (Sick 1997, although see Mazar Barnett *et al.* 2014)—heightens the impression that *C. loricata* belongs outside the Thraupidae.

YELLOW-BELLIED DACNIS *Dacnis flaviventer*

A pair was observed and photographed in tall gallery forest beside the Araguaia just north of Barreira do Campo, Pará, on 16 November 2011 (GMK, SC *et al.*). A specimen (MOG 619) from Araguatins, on the Tocantins side of the river has recently come to light (Dornas & Pinheiro 2011), which appears to be the easternmost record available to date. The previous eastern limit of its range south of the Amazon is the Serra do Cachimbo, in the Tapajós–Xingu interfluvium (Santos *et al.* 2011), some c.800 km to the west of Araguatins and c.700 km from Barreira do Campo, although the recent discovery of *D. flaviventer* north of the Amazon in Amapá (Schunck *et al.* 2011) hints at the possibility of further range extensions.

SAFFRON FINCH *Sicalis flaveola*

This relatively common and widespread South American bird’s range in central Brazil is substantially and consistently under-estimated on maps within standard reference works such as Ridgely & Tudor (1989, 2009) and field guides (e.g. Sigrist 2008). In contrast, Hidasi (1998) mapped Saffron Finch as occurring virtually throughout Tocantins, with the exception of the extreme north of the state, yet simultaneously omitted Orange-fronted Yellow Finch *S. columbiana* from his list. In the Araguaia Valley it is reasonably numerous more or less throughout despite the widespread presence of *S. columbiana*, which occupies similar habitats to the present species. We have found *S. flaveola* from Emas National Park, in extreme south-west Goiás (GMK, AW), in the south, to Araguacema, Tocantins, in the north, including various localities in Mato Grosso (e.g. Vale do Sonho, Serra do Roncador, and Araguaiana) and south-east Pará. Although Buzzetti (2004) and Pinheiro & Dornas (2009a) found only *S. columbiana* in the Parque Estadual do Cantão, Tocantins, *S. flaveola* was already listed for one locality in the Jalapão region (Pacheco & Olmos 2010), also well beyond the range mapped in Ridgely & Tudor (1989, 2009). Furthermore, Saffron Finch is known from even further north in the latter state, e.g. in the Serra dos Carajás (Pacheco *et al.* 2007), although to the west only Stripe-tailed Yellow Finch *S. citrina* has been found, on the Serra do Cachimbo (Pinto & Camargo 1957).

RUSTY-COLLARED SEEDEATER *Sporophila collaris*

Nominate *S. c. collaris* is generally considered to range west as far as Goiás and Mato Grosso from south-east Brazil, in Rio de Janeiro and Espírito Santo (Ridgely & Tudor 1989, Dickinson 2003, Kirwan 2007). There is now ample evidence for its presence further north, in the state of Tocantins, although to date it seems to be confined to the immediate environs of the Ilha do Bananal and the Araguaia Valley, where already mapped by Ridgely & Tudor (2009). Pacheco & Olmos (2006, 2010) failed to find it in south-east Tocantins or the Jalapão region, respectively, and Lopes & Braz (2007) in central Tocantins. A male was observed beside the rio do Coco, just north of Caseara, Tocantins, on 26 January 2002 (GMK, DB, AG, JM) and it was found in small numbers on river islands opposite Caseara on 22–26 August 2002 (AW, KJZ; KJZ videotape) and August 2009 (AW). Buzzetti (2004) found the species at many localities within the Parque Estadual do Cantão, just south of Caseara, and Pinheiro & Dornas (2009a), who considered the species rare in this region, also found *S. collaris* in the Área de Proteção Ambiental Ilha do Bananal. In July 2010 probably several hundreds were present in the region of Rancho Isadora, west of Lagoa da Confusão, Tocantins (GMK, WP). In late December 2008 and July 2010, *S. collaris* was found in relatively small numbers at eight localities in the Araguaia Valley between the rio Babilônia, east of Alto Araguaia, Goiás, and Chapéu de Plano, Goiás, as well as at two localities in immediately adjacent Mato Grosso (GMK, JP, WP). The species has also been found recently in south-easternmost Para (Somenzari *et al.* 2011) and an adult male in moult was observed in a small flock of *c.*50 mixed *Sporophila* at Pingo de Ouro, Floresta de Maués, Amazonas, on 5 June 2010 (AW). The flock also contained Lined Seedeater *S. lineola*, Chestnut-bellied Seedeater *S. castaneiventris*, Wing-barred Seedeater *S. americana* and Blue-black Grassquit *Volatinia jacarina*. Virtually all of the males observed, including those in Tocantins, clearly conformed to *S. c. collaris*. However, the majority of those examined in Goiás (and a minority of those in Tocantins) showed some buff elements in the white parts of the plumage, especially the posterior underparts (see discussion in Kirwan 2007). The only exception was the observation of one or two males clearly attributable to one of the rufous-plumaged subspecies (*S. c. melanocephala* or *S. c. ochrascens*) in rough pasture between Lagoa da Confusão and Barreira da Cruz, Tocantins, on 19 November 2011 (GMK *et al.*).

COPPER SEEDEATER *Sporophila bouvreuil* / **PEARLY-BELLIED SEEDEATER** *S. pileata*

A recent taxonomic revision of the Capped Seedeater *S. bouvreuil sensu lato* recommended to recognise two species, which are partially sympatric, one with reddish-brown male plumage and the other with greyish to white male plumage, namely *S. bouvreuil* and *S. pileata*, respectively, while treating *S. b. saturata* Hellmayr, 1904, and *S. b. crypta* Sick, 1968, as synonyms of *S. bouvreuil* (Machado & Silveira 2011). Machado & Silveira (2010, 2011) pointed to a zone of contact between the two species in the states of São Paulo and western Minas Gerais (the latter around Indianópolis). North of this in the Araguaia Valley, Machado & Silveira (2011) located records (specimens, literature references, etc.) only of *S. bouvreuil*, even during the austral winter. Our surveys of this region, during various months, reveal that *S. pileata* regularly reaches north of the distribution circumscribed by Machado & Silveira (2010, 2011), especially in the austral winter but also during those months (September–March) considered as the breeding season by these authors.

Records of *S. pileata* are as follows. At Emas National Park in October 2005, KJZ & AW recorded two on 24 October, singles on 28–29 October, and 20+ with mixed-species *Sporophila* flocks on 30 October (KJZ photos). Several small flocks were found within mixed groups of *Sporophila* (mostly *S. plumbea*) in Emas National Park, Goiás, on 3–7 November 2007 (AW). In 2008 / 09, small flocks (all of <10) were recorded at Emas National Park, on 22



11



12



13

Figure 11. Scarlet-throated Tanager *Compsothraupis loricata*, Barreira do Campo, Pará, January 2013 (© H. Shirihai / *Photographic handbook of the birds of the world*)

Figure 12. Pearly-bellied Seedeater *Sporophila pileata*, Emas National Park, Goiás, December 2008 (© W. Price)

Figure 13. Orange-backed Troupial *Icterus croconotus*, Barreira do Campo, Pará, January 2009 (© W. Price)

December (Fig. 12), south of Perolândia, Goiás, on 26 December, between Barra do Garças and Araguaiana, Mato Grosso, on 27 December, at Registro do Araguaia, Goiás, on 29 December, and at Aruaña, Goiás, on 30 December (GMK, JP, WP). In 2010, small numbers were present at Água Santa, Goiás, on 3 July and at Aruaña, Goiás, on 5 July (GMK, WP). Photographs posted on www.wikiaves.com.br also indicate that *S. pileata* ranges north to Goiás and eastern Mato Grosso.

S. bouvreuil was a fairly common breeding bird (multiple territorial males singing) in *varjão* (seasonally flooded *cerrado*) by the rio das Mortes, 8 km north of Novo Santo Antônio, Mato Grosso, in early May 2004 (AW). There was a single male at Aruaña, Goiás, on 30 December 2008, with small numbers at Barreiro do Campos, Pará, on 2 January 2009 and between the rio Caiapó and Araguacema, Tocantins, on 4 January 2009 (GMK, JP, WP), as well as one at Registro do Araguaia, Goiás, on 3 July 2010, a single male and five males at Rancho Isadora, west of Lagoa da Confusão, Tocantins, on 12 and 13 July 2010, respectively (GMK, WP), a single male at Conceição do Araguaia, Tocantins, on 4 November 2011 (GMK *et al.*) and small numbers again at Barreira do Campos, Pará, on 10 January 2013 (GMK, HS).

Additionally, we report a second record of sympatry between *S. pileata* and *S. bouvreuil* from western Minas Gerais, namely at least three male *bouvreuil* among many *S. pileata* and

other seedeaters midway between Piumhi and São Roque de Minas, on 28 October 2011 (GMK *et al.*).

MARSH SEEDEATER *Sporophila palustris*

Currently treated as Endangered by BirdLife International (2008). Breeds in north-east Argentina (in Corrientes, Entre Ríos and possibly Buenos Aires), southernmost Brazil (Rio Grande do Sul), parts of Uruguay (Ridgely & Tudor 2009) and perhaps in Paraguay (BirdLife International 2008), moving north post-breeding, to south-central Brazil. In addition to records from Bahia, Minas Gerais, Goiás, Mato Grosso, Mato Grosso do Sul, São Paulo and Paraná, it probably also occurs in Santa Catarina, and the species perhaps winters in north-east Paraguay too, but there are very few records (BirdLife International 2008, De Luca *et al.* 2009, Ridgely & Tudor 2009, Lopes *et al.* 2010). At least one recent record from extreme south-east Para, at Fazenda Fartura (09°40'S, 50°23'W), but no details of the numbers involved have been published (Somenzari *et al.* 2011, Cavarzere *et al.* in press). Recent evidence for the species' presence during the austral winter in Tocantins has been published. F. Olmos (*in* De Luca *et al.* 2009) reported significant flocks of *S. palustris* in the north-east of the state at the border with Maranhão, in the Monumento Natural das Árvores Fossilizadas (07°25'05"S, 47°45'58"W), but subsequently Olmos & Pacheco (2011) mentioned just a single male on 5 July 2005, while Dornas *et al.* (2013) mentioned observing four males at the confluence of the rios Formoso and Xavante, in the municipality of Dueré, on 6–7 October 2011. The following records therefore appear to be the second for the state of Tocantins: minima of ten males on 11 July 2010 and five males on 12 July 2010 at Rancho Isadora, west of Lagoa da Confusão (10°49'S, 49°71'W: GMK, WP). The species is easily identified given the white throat, upper breast and cheeks, contrasting strongly with the grey cap and rufous posterior underparts, in particular. GMK has experience with this species from north-east Argentina in the breeding season. Other seedeaters present in the same area for comparison included the following four species, as well as *S. collaris*, Plumbeous Seedeater *S. plumbea*, Yellow-bellied Seedeater *S. nigricollis*, Double-collared Seedeater *S. caerulescens*, White-bellied Seedeater *S. leucoptera* and *S. bouvreuil*, which formed mixed flocks (at least one of which contained all 11 species) of up to 200 individuals. The birds frequented tall grass alongside dirt roads, but they also frequented well-vegetated wet ditches between rice cultivation and fed in soya crops. Given the large numbers of birds present and the practical impossibility of separating the females and or non-adult males of many species in the field, the true numbers of all species of conservation concern listed here can be expected to be significantly greater than recorded. Follow-up surveys for these species during future austral winters should be attempted to more accurately estimate the numbers of *S. palustris* and *S. cinnamomea*, in particular, wintering in this region of Tocantins. In addition, 6+, including several adult males, observed at Emas National Park on 30 October 2005, associated with a large mixed-species *Sporophila* flock (AW, KJZ).

CHESTNUT SEEDEATER *Sporophila cinnamomea*

The globally Vulnerable *S. cinnamomea* breeds in north-east Argentina, western and extreme south-east Uruguay, extreme south-east Paraguay and southernmost Brazil (in western and south-central Rio Grande do Sul). It is presumed to winter principally in Brazil (where there are records in Pará, Goiás, Minas Gerais, São Paulo, Mato Grosso do Sul and Paraná) but perhaps also in north-east Paraguay (Ridgely & Tudor 1989, BirdLife International 2008, De Luca *et al.* 2009, Ridgely & Tudor 2009, Lopes *et al.* 2010). The following records appear to be the first modern records for the state of Tocantins (the species was listed without details by Hidasi 1998, apparently on the basis of specimens from Tocantínia, collected May 1964:

MZUSP 70000): two males on 11 July 2010 and a single male on 12 July 2010 at Rancho Isadora, west of Lagoa da Confusão (GMK, WP). Near-direct comparison was possible with the similar males of Rufous-rumped Seedeater *S. hypochroma*, which has a grey mantle, and with Capped Seedeater, which has a black cap and has the reddish feathering a much more tawny-pink colour. See also comments under *S. palustris* concerning habitat utilised by these birds. Subsequent records are available from the confluence of the rios Formoso and Xavante, municipality of Dueré, October 2011 (WA 1032454), and Pedro Afonso, October 2012 (Dornas *et al.* 2013). Additional records for Goiás are as follows: in Emas National Park, within a large mixed-species flock of 200+ *Sporophila*, AW & KJZ saw at least 20 (many of them apparently subadult males in varying transitional plumage stages; KJZ photos) on 30 October 2005, while two adult males were observed with *S. plumbea* on 4 November 2009 (AW) and an adult male was seen at a large *brejo* c.10 km from Chapadão de Céu on 25 November 2011, with *S. caerulescens* and *S. plumbea* (AW).

DARK-THROATED SEEDEATER *Sporophila ruficollis*

Treated as Near Threatened (BirdLife International 2008), *S. ruficollis* occurs in Bolivia (dptos. Beni, Santa Cruz, La Paz and Tarija), southern Brazil (where recorded in southern Mato Grosso, Mato Grosso do Sul, southern Goiás, western and central Minas Gerais, western São Paulo and Rio Grande do Sul), Paraguay (south-east and Chaco), northern Uruguay and northern Argentina south to Tucumán, northern Córdoba, Santa Fe and rarely Buenos Aires (Ridgely & Tudor 1989, 2009, Vasconcelos *et al.* 2006, De Luca *et al.* 2009). In Brazil, there are also recent records for Rondônia state, an adult male in June 2003 (Whittaker 2004), and southern Amazonas state, an adult male at Fazenda Açuã (Canutama municipality) on 26 July 2010 (F. Olmos, S. & E. Rumsey *in litt.* 2010) and, further north, one feeding in roadside vegetation at Tupana Lodge on 22 July 2010 (AW), and the species has also been reported from Fazenda Fartura, in extreme south-east Pará, but without precise details of numbers or dates (Somenzari *et al.* 2011, Cavarzere *et al.* *in press*). Dornas *et al.* (2013) reported the first records for Tocantins and the northernmost ever: Brejinho de Nazaré (10°42'S, 48°28'W) in August 2001, and Lagoa da Confusão, (10°33'S, 49°55'W) in July 2003. In addition, there were three males on 12 July 2010 and a single male on 13 July 2010 at Rancho Isadora, west of Lagoa da Confusão (GMK, WP). Both observers are familiar with this species from southern Brazil and northern Argentina, and males are, in any case, relatively easy to identify given reasonable views, based on the dark throat, grey crown and dark brick-red underparts. See also comments under *S. palustris* concerning habitat utilised by these birds.

RUFIOUS-RUMPED SEEDEATER *Sporophila hypochroma*

Treated as Near Threatened (BirdLife International 2008), this seedeater is known to breed in north-east Argentina, northern and eastern Bolivia (Ridgely & Tudor 1989, Roda & López-Lanús 2008) and eastern Paraguay (BirdLife International 2008). For Brazil, Sick (1997) mentioned only the record of a large mixed-species flock involving both this species and *S. palustris*, and other congeners, at Emas National Park, Goiás, in October 1984 (where a male of the present species was observed by AW & KJZ on 30 October 2005), but it was also found during October 1979 in the Pantanal east of Corumbá, Mato Grosso do Sul (Ridgely & Tudor 1989). Other records from southern Brazil include those at Fazenda Rio Negro, Aquidauana municipality, Mato Grosso do Sul (Cestari 2006, De Luca *et al.* 2009) and small numbers seen between Pontes e Lacerda and Vila Bela da Santíssima Trindade, in south-west Mato Grosso, in August 2007 and June 2008 (Kirwan & Areta 2009), while Whittaker (2004) reported the first record from Amazonian Brazil, in Rondônia, in June

2003. Other records involve two males at Serra da Canastra National Park, south-west Minas Gerais, in October 1996 (Silveira 1998) and single males there on 22 October 2005 (R. Raby *et al.* in Mazar Barnett *et al.* 2006: 92) and 7 November 2009 (GMK, HS), with three males and a female at a marsh just south of Campinópolis, just south-east of the national park, on 28 October 2011 (GMK *et al.*). These are apparently the sole reports for Minas Gerais. The species was recently recorded in significant numbers in north-east Tocantins at the border with Maranhão, in the Monumento Natural das Árvores Fossilizadas (see Marsh Seedeater), by far the northernmost published locality, while Dornas *et al.* (2013) reported another sight record from the municipality of Dueré in October 2011. We report apparently the second record for Tocantins and further evidence that the species winters much further north than previously considered: four males on 12 July 2010 and a single male on 13 July 2010 at Rancho Isadora, west of Lagoa da Confusão (GMK, WP). Both observers are familiar with this species from southern Brazil and northern Argentina, and males are, in any case, relatively easy to identify given reasonable views, based on the largely grey upperparts, which separate this species from male Chestnut Seedeater *S. cinnamomea*. See also comments under *S. palustris* concerning habitat utilised by these birds.

TAWNY-BELLIED SEEDEATER *Sporophila hypoxantha*

S. hypoxantha breeds across the Southern Cone, from northern and eastern Bolivia south through Paraguay to northern Argentina, and including parts of southern Brazil (Ridgely & Tudor 1989, Sick 1997, BirdLife International 2008). Considered rare in Minas Gerais (Lopes *et al.* 2010). Records further north in Brazil, e.g. in Goiás, are sometimes assumed to pertain to migrants (Sick 1997) although the species' presence in late December and early April in Emas National Park (GMK pers. obs.) suggests that *S. hypoxantha* breeds in at least the extreme south-west of the state. We report what is apparently the third record for Tocantins, following up to 15 males on 5 July 2005 at the Monumento Natural das Árvores Fossilizadas (Olmos & Pacheco 2011) and a specimen taken in the municipality of Peixe (Dornas *et al.* 2013): two males on 12 July 2010 and the same number on 13 July 2010 at Rancho Isadora, west of Lagoa da Confusão (GMK, WP). Subsequently, Dornas *et al.* (2013) reported a male at the confluence of the rios Formoso and Xavante, municipality of Dueré, October 2011. For now we assume that these birds were austral migrants, given that they were mixed with many other obvious migrants and there has been no previous suggestion that *S. hypoxantha* occurs this far north. Care was taken to separate this species from the previous: in comparison to those Rufous-rumped Seedeaters positively identified, males of the present species had noticeably paler rufous rump patches and generally paler, less deep-coloured underparts, and perhaps marginally browner (less grey) upperparts. In addition to Emas, we are familiar with this species from various localities in southern Brazil, e.g. in south-west Mato Grosso. See also comments under *S. palustris* concerning habitat utilised by these birds.

BLACK-BELLIED SEEDEATER *Sporophila melanogaster*

AW encountered an adult male of this unmistakable bird feeding with 15 *S. plumbea* on a dirt road at the edge of Emas National Park, Goiás, on 3 November 2009. Recorded from the Distrito Federal in February and May (Sick 1997), with additional records there in October–November 2011 (www.wikiaves.com.br).

GREAT-BILLED SEED FINCH *Sporophila (Oryzoborus) maximiliani*

Treated as Near Threatened by BirdLife International (2008), the species is now extremely rare throughout its Brazilian range due to demand from cagebird enthusiasts. At least

formerly, in Brazil, Great-billed Seed Finch occurred from Alagoas south to São Paulo and locally west to central Mato Grosso, as well as in Amapá and around Belém (Pará), with other records from south-east Pará and Rondônia (Ridgely & Tudor 1989, Sick 1997). We have records, all of single males or females, from two areas: Emas National Park, south-west Goiás—a territorial adult male and female in gallery forest on 25 October 2005 (AW, KJZ; tape-recorded and photographed), a female-plumaged bird on 6 November 2007, responding to a Ferruginous Pygmy Owl *Glaucidium brasilianum* imitation (AW), a female on 22 December 2008 (GMK, JP, WP) and another female on 4 November 2009 (AW)—and just north of Caseara, Tocantins (female on 3 January 2009: GMK). The species was not reported for the latter region by Buzzetti (2004) or Pinheiro & Dornas (2009a), or for the state of Tocantins by Hidasi (1998). The latter author did, however, already list the species for Goiás (Hidasi 2007). Park guards in Emas reported to AW that they have not seen males there for a number of years, and the species might be close to extinction even in this protected area. Numbers of the considerably more widespread Chestnut-bellied (Lesser) Seed Finch *S. angolensis* in the Araguaia Valley remain reasonably healthy, in contrast to many areas of Brazil, where its populations too have been decimated for the cagebird trade. Further field work in this region of central Brazil might yet reveal some reasonable populations of *S. maximiliani*.

COAL-CRESTED FINCH *Charitospiza eucosma*

Listed for south-east Pará by Novaes (1960), despite the species' comparatively wide range it is currently considered Near Threatened (BirdLife International 2008) as many suitable *cerrados* have already fallen 'under the plough'. Large numbers (probably several tens) of this beautiful finch were present at Barreira do Campo, also in south-east Pará, on 25 and 27 January 2002 (DB, AG, GMK, JM).

ORANGE-BACKED TROUPIAL *Icterus croconotus*

The widespread Troupial *I. jamacaii sensu lato* is now generally considered to comprise three species (e.g. by Gill & Wright 2006, Ridgely & Tudor 2009). Campo Troupial *I. jamacaii* is restricted to north-east Brazil, with *I. croconotus* across much of Amazonia, south to northern Argentina and east to the rio Tapajós and southern Goiás, and Venezuelan Troupial *I. icterus* in northern South America, from northern Colombia through Venezuela and on the islands of the former Netherlands Antilles (Jaramillo & Burke 1999). Both *I. croconotus* and *I. jamacaii* occur at Belém, Pará, the latter taxon in part naturally, the former species solely through escapees (Silva & Oren 1990). *I. croconotus* was observed in tall riverine forest at Barreira do Campo, Pará, on 12 September 2004 and 2–3 January 2009, being photographed there by WP on the last-named date (Fig. 13), and the species had also been found at many localities within the Parque Estadual do Cantão, just south of Caseara, Tocantins, by Buzzetti (2004). In contrast, Pinheiro & Dornas (2009a) listed *I. jamacaii* for the latter protected area. In addition, a pair and a single *I. croconotus* were observed at Luís Alves, on the rio Araguaia west of São Miguel do Araguaia, Goiás, on 8 and 9 July 2010, respectively (GMK, WP), two vocalising birds were recorded at Caseara on 22 August 2002 (KJZ) and at least two were seen at Caseara on 16 November 2011 (GMK *et al.*). Pacheco & Olmos (2006) found *I. croconotus* at one locality in south-east Tocantins, where it is at least locally sympatric with the more widespread *I. jamacaii* in this part of the state. In the Jalapão, Pacheco & Olmos (2010) recorded only the latter species. Ridgely & Tudor (1989, 2009) mapped *I. jamacaii* as extending just west of the Araguaia, and *I. croconotus* as not penetrating the Araguaia Valley from south-west Brazil. As long ago noted by Hellmayr (1908: 39), and confirmed by the recent observations above, *I. croconotus* plainly extends well north in the Araguaia–

Tocantins interfluvium, although he subsequently recommended (Hellmayr 1937: 140) that the rio Araguaia specimen, a female, be re-examined. To date, there is no specific evidence that *I. jamacaii* reaches, let alone crosses, the Araguaia, though it should be looked for in the extensive *cerrados* of western Tocantins.

SCREAMING COWBIRD *Molothrus rufoaxillaris*

Approximately ten adults together with one of the distinctive juveniles, at Caseara, Tocantins, on 1 January 2009 (GMK, JP, WP). Identified on the basis of the juvenile, which might only be confused with any age of Pale Baywing *Agelaioides (badius) fringillarius*, but is considerably darker over the head and body. Screaming Cowbird is generally considered to be restricted to southern and central parts of continental South America (e.g. Ridgely & Tudor 1989, Jaramillo & Burke 1999), with the northernmost record being generally stated to be from Guanacos, Santa Cruz, Bolivia (Remsen *et al.* 1987), although most authors of recent general works have noted evidence of an expanding range in eastern Brazil. This was subsequently confirmed by a steady advance through central and northern Minas Gerais (D'Angelo Neto 2000, Kirwan *et al.* 2001). Thereafter Pacheco & Olmos (2006) mentioned the species for three localities in south-east Tocantins, and subsequently for Jalapão (Pacheco & Olmos 2010), and there are also several records on WA. Hidasi (1998) did not mention the species for Tocantins. The January 2009 sight record becomes marginally the northernmost published to date.

WHITE-BROWED BLACKBIRD *Sturnella superciliaris* /

RED-BREASTED BLACKBIRD *S. militaris*

A male *S. superciliaris* was in rough pasture and heavily modified *cerrado* south of the town of Registro do Araguaia, west-central Goiás, on 29 December 2008, with <5 in the same area on 3 July 2010, and two males and a female in *campo sujo* just south of the rio Piranhas between Araguacema and Senhor do Bonfim, western Tocantins, on the right bank of the Araguaia, on 4 January 2009 (GMK, JP, WP). On the opposite bank of the latter river, GMK *et al.* found at least one male *S. militaris* in *cerrado* at Barreira do Campo, south-east Pará, on 12 September 2004 (*cf.* Dornas *et al.* 2007). Other records of *S. superciliaris* from the Araguaia Valley are as follows: <5 in wet grassland south of Itacaiú, Mato Grosso, on 5 July 2010, and up to 30 in small groups or pairs between Lagoa da Confusão and Barreira da Cruz, Tocantins, on 10–13 July 2010 (GMK, WP). A handful of singing males of *S. militaris* were found (and photographed by HS) in cleared areas near Pakaas Palafitas lodge, south of Guajará-Mirim, on the right bank of the rio Mamoré, Rondônia, on 13 November 2006 (GMK) and two male *superciliaris* were present among a group of *militaris* on a beach at the confluence of the rios Purus and Ituxi, south of Lábrea, southern Amazonas, on 17 August 2006 (AW, KJZ). The latter is apparently the first record for the state of Amazonas. Parker & Remsen (1987) already drew attention to the apparent range extension of *S. militaris* in south-west Amazonia, and Sick (1997) to the expanding range of *S. superciliaris* in south-east Brazil. With the exception of the recently reported records of *S. superciliaris* in Tocantins and Maranhão (Dornas *et al.* 2007, Pacheco & Olmos 2010, Sousa Ferreira 2014), these records are more or less beyond the known ranges of these species, and also indicate that they might well come into contact in this region of Brazil, as indeed they do in north-west Bolivia (in dptos. Beni and La Paz), south-east Peru (in dpto. Madre de Dios) and easternmost Amazonian Brazil (in Pará and Maranhão) (Jaramillo & Burke 1999, Fraga 2011). There seem to be few specific mentions of Red-breasted Blackbird for the state of Rondônia, although the species was collected at Maroins, on the rio Machados (= Calama, on the Jiparaná; 08°03'S, 62°53'W), then in Mato Grosso, by Hoffmanns in the late 1890s (Hellmayr 1910, Naumburg 1930). The

range of White-browed Blackbird in the interior of Brazil is generally listed as extending as far north as central Mato Grosso and southern Goiás (Ridgely & Tudor 1989, Jaramillo & Burke 1999). This species is considered to be migratory in south-east Peru (Jaramillo & Burke 1999), whilst *S. militaris* is reputedly at least partially so in Costa Rica (Kiff 1975). It remains to be seen whether that is true of those *S. superciliaris* or *S. militaris* in central Brazil, though Dornas *et al.* (2007) speculated that it appears to be the case for the first-named.

BOBOLINK *Dolichonyx oryzivorus*

Early morning on 4 November 2009, AW heard the distinctive metallic call of this species and observed a lone female in a large *brejo* c.10 km west of Chapadão de Céu; the bird called several more times before flying off high to the south. This appears to be the first state record for Goiás (Hidasi 2007), although a female was subsequently photographed at relatively nearby Araguaiana, Mato Grosso, on 29 May 2011 (R. Giroto; WA 385578).

GOLDEN-RUMPED EUPHONIA *Euphonia cyanocephala*

We detected the presence of a small population of this species (presumably pertaining to the Atlantic Forest subspecies *E. c. aureata*) in Emas National Park, extreme south-west Goiás, although it remains to be demonstrated whether *E. cyanocephala* is resident there or not: a male on 6 November 2007 (AW) and at least two males and two females on 23 December 2008 (GMK, JP, WP). In southern Brazil, *E. cyanocephala* is present from southern Bahia south to Rio Grande do Sul and inland to Minas Gerais and São Paulo (Ridgely & Tudor 1989), but further south in the Atlantic Forest region Areta & Bodrati (2010) recently demonstrated that Golden-rumped Euphonia is merely an autumn / winter visitor to eastern Paraguay and north-east Argentina (Misiones). *E. cyanocephala* was listed for Goiás by Hidasi (2007) and Hilty (2011), but without details as to its distribution. Other, apparently highly disjunct, populations of *E. cyanocephala* occur in parts of the Guianan Shield and southern Mato Grosso (Brazil) / eastern Bolivia (Ridgely & Tudor 1989, 2009). Still others, e.g. in the Serra dos Carajás, Pará (Pacheco *et al.* 2007), are not mapped by standard references such as Ridgely & Tudor (2009). For now, we tentatively assume that the Emas population is another such isolate, rather than the records there being indicative of migration.

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Stars in their eyes: iris colour and pattern in Common Mynas *Acridotheres tristis* on Denis and North Islands, Seychelles

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SUMMARY.—An examination of Common Mynas *Acridotheres tristis*, trapped during eradication attempts on Denis and North Islands, Seychelles, revealed a wide variety of background colours and patterns of silvery white spots (which we named ‘stars’) in the irises. Explanations for the variation were sought via comparison of iris colour and pattern with the birds’ age, sex, body condition, primary moult score and gonad size, and a sample of live birds was kept in captivity to examine temporal changes in iris colour and pattern. Juveniles initially had grey irises without stars, but through gradual mottling stars developed and other colours, especially brown, developed as bands within the iris. These changes took place within 3–7 weeks of capture; no major changes were observed in the irises of a small sample of adults over 17 weeks in captivity. No sex differences in colour or pattern were detected, but seasonal differences were apparent, particularly in that multiple bands of stars were more common in the breeding season, and grey irises were more prevalent in the non-breeding season. There was no association between iris colour/pattern and body condition index or primary moult score, but only in females was there a suggestion of a relationship between gonad size and two of the colour/star categories. The functional significance of iris variation in Common Mynas is uncertain and requires further study.

Following deliberate introduction by man, Common Mynas (hereafter ‘mynas’) have become established on many tropical oceanic islands where they can cause agricultural, human health and environmental problems (Feare & Craig 1998), and are commonly regarded as invasive aliens. During recent assessments as to the feasibility of eradicating introduced populations, mainly due to their adverse impacts on indigenous fauna and flora (Feare & Saavedra 2009, Feare 2010), large numbers have been handled and extensive variation in iris colour and pattern noted.

Common Starlings *Sturnus vulgaris* are members of the family Sturnidae to which Common Mynas belong. Iris colour in Common Starlings varies with age and sex (Feare 1984), as it does in some African starling species (Craig 1988, Sweijd & Craig 1991). In the genus *Acridotheres* most of the nine species are described as having dark irises, but in Jungle *A. fuscus* and White-vented Mynas *A. javanicus* it is conspicuously bright yellow. Most passerines have a dull brown iris, but in some groups, including starlings, many species have a conspicuously pigmented iris, the possible functions of which remain unresolved (Craig & Hulley 2004). In some species, iris colour can change transiently over very short time periods (McCulloch 1963, Britton & Britton 1970, Rowley 1978) and in Black-bellied Starlings *Lamprotornis coruscus* the colour changes seasonally (Chittenden & Myburgh 1994). Craig (1998) reported that in Pied Starlings *Lamprotornis bicolor* pupil contraction during some social activities led to an apparent increase in size of the pale iris. These changes might be indicative of a social signalling role of iris coloration.

No study has focused on iris variation and its possible functions in Common Mynas. However, the colour and pattern of the iris have been variously described. Feare & Craig (1998) and Craig & Feare (2009), following Ali & Ripley (1974), described irises as 'brown or reddish-brown mottled with white'. Roberts (1992) noted that the iris was brown, while Cramp & Perrins (1994) described the adult iris as 'brown to brown-red, often with white specks' and that the iris of juveniles is brown. Sengupta (1982) did not mention iris colour in his monograph on the species.

In an attempt to understand variation in iris colour in Common Mynas and to look for age and sex differences, birds caught during eradication attempts on Denis Island (03°48'S, 55°39'E) and North Island (04°23'S, 55°15'E), Seychelles, in 2010–2012, were examined in detail. A further aim was to search for correlates that might indicate a relationship between iris variation and health status or behaviour.

Methods

The eradication attempt on Denis Island was undertaken in two phases, May–July 2010 (non-breeding season, when most birds were in wing moult—see Results) and October 2010–March 2011 (breeding season, adults not in wing moult), and the North Island attempt was in October–November 2012 (early breeding season, adults not in wing moult).

Some 1,455 mynas were caught alive, 1,307 of them in decoy traps, using a living myna in a central compartment as an attractant (Feare 2010), the rest in traps or mist-nets without decoys. Iris features, background colour and the presence or absence, and pattern if present, of small white or silver-white spots (hereafter 'stars') of trapped birds were recorded while alive. Bill colour, body mass (measured with a Pesola balance), combined head and bill length (using Vernier callipers), wing length (flattened chord measured with a wing rule), primary moult score (Ginn & Melville 1983—determined only for the right wing and, as members of the Sturnidae possess only nine large primaries, the maximum moult score of one wing with all primaries renewed is 45), and gonad size (ovary length and left testis length measured with callipers) were recorded following humane dispatch.

Description of irises.—Background iris colours included uniform grey, mottled grey, brown, reddish brown and red. Two or three concentric bands of these colours, varying in width, commonly occurred. Embedded within the colour bands were patterns of 'stars', recorded as no stars, single ring of stars or multiple stars (a broad band of stars, usually in the centre of the iris, encircling the pupil). If present, the stars generally formed complete rings around the iris, but occasionally formed a partial ring, e.g. as a semi-circle.

Full descriptions of the colour and pattern of each bird were recorded; all co-authors participated in this, following instruction from CJF. Descriptions were converted into numerical scores by CJF as follows: 1 = grey with no stars, 2 = grey with stars, 3 = grey + brown with stars, 4 = grey + red with stars, 5 = brown with stars, 6 = brown + red with stars, and 7 = red with stars. These categories were ordered according to intensity of colour; in the absence of information on the development of iris colour, the scoring system excluded any assumption of progression from one category to another.

Iris colour categories were compared between ages and sexes within the three phases of eradication, as were the presence / absence and abundance (single or multiple bands) of stars. Colour categories and star distribution were also compared between breeding and non-breeding seasons on Denis Island.

Age and sex.—Birds were aged as adult or juvenile based on two criteria. Juveniles were separated on the basis of brown feathers without gloss on the crown (Ali & Ripley 1972, Feare & Craig 1998), and the presence of an all-yellow bill, lacking the dark, slate-grey mark at the base of the lower mandible of adults (CJF pers. obs.). Birds were sexed by dissection,

which was possible for most adults, but proved impossible in a proportion of juveniles because their gonads could not be located.

Iris colour change in captive juveniles and adults.—To determine the extent and rate of change with age in young birds, and to determine if changes occurred in colour or pattern in adults over time, seven juveniles and four adults were kept in captivity from late October 2010 to early March 2011, i.e. *c.*17 weeks. They were given *ad lib* water and food: bread, fruit and proprietary pet bird food. Each individual could be identified from colour rings. The precise age of the juveniles was unknown, but they were selected on the basis of the age characters mentioned above. Iris colour and pattern of all birds were recorded and photographed at approximately weekly intervals.

Statistical analysis.—Relationships between iris colour category and pattern with age, sex and season (breeding / non-breeding) were explored using chi-square tests. A multinomial model was then run in *nnet* (Venables & Ripley 2002) using the function *multinom* with a binomial distribution and log link in R version 3.0.1 (R Core Team 2013). The dependent variable was iris category (seven factors as described above) and the independent variables were body condition (body mass / length of head and bill), gonad size (mm) and primary moult score (0–45).

Results

Timing of eradication attempts in relation to breeding and primary moult.—On Denis Island, two phases of trapping occurred, May–August 2010 and November 2010–March 2011. During the former, adults were in active primary moult (mean moult scores for females and males respectively: May 26.9 ($n = 18$), 28.6 ($n = 18$); June 31.0 ($n = 118$), 32.2 ($n = 115$); July 36.6 ($n = 54$), 38.2 ($n = 52$); and August 39.9 ($n = 74$), 42.0 ($n = 79$). During this phase, seven of 257 females had large oocytes; four of these were in active primary moult. Mean left testis length of 272 males was 4.95 ± 0.11 (S.E.) mm.

During the second phase on Denis Island, the mean primary moult score of 84 females was 44.93, all but one individual having complete sets of new primaries; all 95 males had fully grown primaries. Seven of 79 females had enlarged oocytes (three of them with eggs in the oviduct). The proportion of females with enlarged oocytes was significantly greater during this phase than during the first phase ($\chi^2_1 = 5.08$, $P = 0.028$). Mean left testis length was 7.27 ± 0.17 mm, significantly greater than in phase one ($t_{160} = 11.32$, $P < 0.001$).

On North Island, trapping occurred in October–December 2012. Of 252 females, just one was in active primary moult and mean moult score was 44.96, while all of 242 males had completed moult. Eighteen of the females had enlarged oocytes, but none had eggs in the oviduct. Mean left testis length was 6.69 ± 0.18 mm, significantly greater than that of phase one birds on Denis ($t_{505} = 8.51$, $P < 0.001$), but the difference from phase two birds was not significant ($t_{321} = 1.84$, $P = 0.067$).

The larger testis length in males, and presence of more enlarged oocytes in females, during the October–March trapping on Denis Island and October–December trapping on North Island, compared to the May–August trapping on Denis, indicated that the main breeding period for Common Mynas on these islands falls within the wetter north-west monsoon in October–March. The lack of primary moult during this breeding season indicates that breeding and moult are usually mutually exclusive, but four of the seven females trapped in May–August with enlarged oocytes were in active primary moult. This suggests that some breeding might occur during the drier south-east trade wind season and that the division between breeding and primary moult is not absolute.

Age-related iris colour and pattern.—Over the three phases of the eradication attempt, 70 of 82 (85.4%) birds identified as juveniles had grey irises (iris colour categories 1 and 2;

Table 1), while 195 of 726 (26.9%) adults had grey irises ($\chi^2_1 = 43.43$, $P < 0.001$), indicating that a grey iris is a predominantly juvenile characteristic, while the irises of adults have more brown and red pigmentation (categories 3–7). The distribution of colour categories of mynas caught on Denis Island during the non-breeding (March–July) and breeding seasons (October–March) differed significantly ($\chi^2_6 = 121.75$, $P < 0.001$), with a higher proportion of birds having grey irises in the former (Table 1). The same was apparent when comparing the Denis Island non-breeding sample with North Island birds during the early breeding season ($\chi^2_6 = 194.33$, $P < 0.001$).

During the non-breeding season on Denis Island 98.8% of adult mynas had stars in their iris (i.e. iris categories 2–7, Table 1), while in both breeding-season samples (Denis and North Island) all adults had stars in their irises. In contrast, most juveniles (70.0%, 74.4% and 55.6%, respectively, Table 1) lacked stars. As samples of juveniles were small, the analysis data for the three periods were combined, as were categories 3–7. The resulting 3×2 matrix showed that the differences in the colour patterns of adults and juveniles were significant ($\chi^2_2 = 504.38$, $P < 0.001$), with juvenile irises predominantly grey, while adult irises were more likely to contain two or more colour bands of brown and red, and also stars.

Sex-related iris colour and pattern.—Small sample sizes in some colour categories of adult female and male mynas (Table 2) necessitated the combination of categories 1 and 2 in all time periods, and of 6 and 7 in the two breeding-season samples. There were no differences in the resulting patterns of colour categories between the sexes ($\chi^2_5 = 9.80$, $P = 0.081$; $\chi^2_4 = 4.74$, $P = 0.315$; $\chi^2_4 = 3.95$, $P = 0.413$, respectively).

Seasonal differences in iris colour of adults on Denis Island.—The patterns of iris coloration in mynas caught during the non-breeding (March–July 2010) and breeding seasons (October 2010–March 2011) on Denis Island differed ($\chi^2_6 = 123.99$, $P < 0.001$).

TABLE 1

Numbers of juvenile and adult Common Mynas *Acridotheres tristis* showing iris colour / pattern categories 1–7 (see text) in samples obtained during the non-breeding and breeding seasons on Denis Island, and during the early breeding season on North Island, Seychelles.

| | Age | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|--------------------------------------|-----|----|-----|-----|----|----|----|----|
| Denis, May–Jul 2010 (non-breeding) | Juv | 21 | 5 | 0 | 1 | 1 | 1 | 1 |
| | Ad | 4 | 166 | 54 | 63 | 21 | 6 | 21 |
| Denis, Oct 2010–Mar 2011 (breeding) | Juv | 32 | 4 | 7 | 0 | 0 | 0 | 0 |
| | Ad | 0 | 9 | 63 | 69 | 12 | 12 | 3 |
| North, Oct–Nov 2012 (early breeding) | Juv | 5 | 3 | 1 | 0 | 0 | 0 | 0 |
| | Ad | 0 | 16 | 127 | 15 | 46 | 14 | 5 |

TABLE 2

Numbers of adult female and male Common Mynas *Acridotheres tristis* showing iris colour / pattern categories 1–7 (see text) in samples obtained during the non-breeding and breeding seasons on Denis Island, and during the early breeding season on North Island, Seychelles.

| | Sex | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|--------------------------------------|--------|---|----|----|----|----|----|----|
| Denis, May–Jul 2010 (non-breeding) | Female | 3 | 77 | 24 | 31 | 13 | 5 | 18 |
| | Male | 1 | 89 | 30 | 32 | 8 | 1 | 7 |
| Denis, Oct 2010–Mar 2011 (breeding) | Female | 0 | 2 | 25 | 35 | 7 | 7 | 1 |
| | Male | 0 | 7 | 38 | 34 | 5 | 5 | 2 |
| North, Oct–Nov 2012 (early breeding) | Female | 0 | 6 | 56 | 7 | 20 | 11 | 2 |
| | Male | 0 | 9 | 55 | 7 | 18 | 3 | 2 |

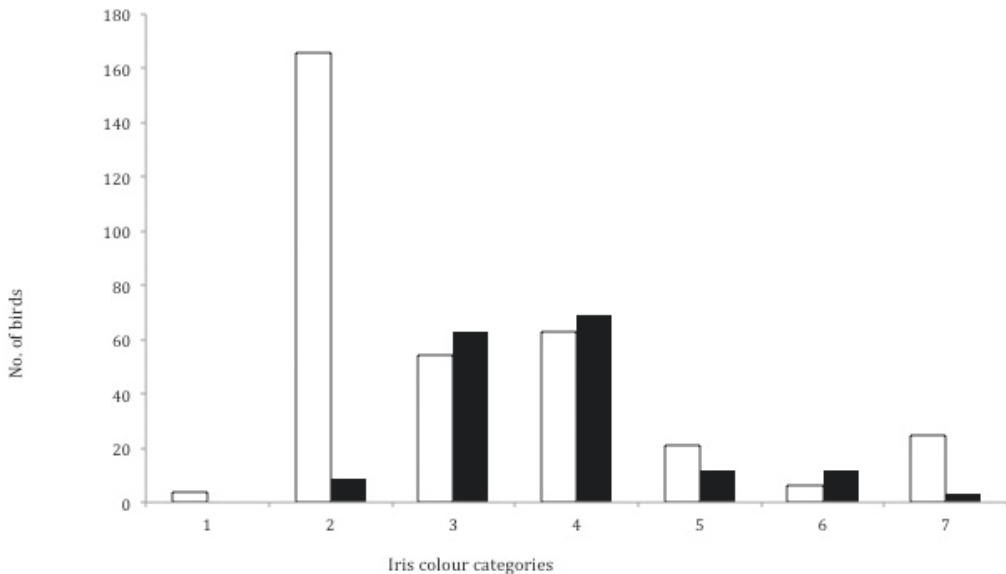


Figure 1. Distribution of iris colour categories in adult mynas on Denis Island during the non-breeding (open bars, $n = 339$) and breeding (black bars, $n = 168$) seasons. See text for definition of the categories.

During the former, category 2 (iris grey with stars) predominated, whereas in the latter the predominant categories were 3 (grey + brown with stars) and 4 (grey + red with stars) (Fig. 1).

Seasonal differences in star patterns of adults.—In the early breeding-season sample from North Island, there was no difference in the proportion of birds with single or multiple rows of stars ($\chi^2_1 = 0.03$, $P = 0.879$, NS; $n = 122$ males, 145 females). On Denis Island, however, during the breeding season significantly more adults of both sexes combined had multiple stars than during the non-breeding season ($\chi^2_1 = 97.22$, $P < 0.001$; $n = 177$ breeding, 339 non-breeding). There were also differences between the sexes in the non-breeding and breeding seasons, with a higher proportion of males (12 of 168) with multiple stars than females (three of 171) in the non-breeding season, although the samples of both sexes with multiple stars were small ($\chi^2_1 = 5.82$, $P = 0.016$). During the breeding season the sex bias was reversed, with a higher proportion of females (40 of 83) than males (27 of 94) possessing multiple stars ($\chi^2_1 = 7.10$, $P = 0.008$).

Iris colours of adults in relation to primary moult score, body condition index and gonad size.—In the multinomial model data from Denis Island, breeding and non-breeding seasons were combined because moult and breeding were confined to the non-breeding and breeding seasons, respectively, and thus were not contemporaneous. In males, the model produced no statistical significance of gonad size ($n = 167$, $P > 0.05$), moult ($n = 167$, $P > 0.05$) or body condition index ($n = 167$, $P > 0.05$) with iris category. In females there was no significance of body condition index ($n = 164$, $P > 0.05$) or moult ($n = 164$, $P > 0.05$), but significant associations were found between iris stages 3 (grey + brown with stars) ($n = 164$, $P = 0.03$, SE = 0.1) and 5 (brown with stars) ($n = 164$, $P = 0.04$, SE = 0.1) with gonad size.

Iris change in captive juveniles and adults.—The unknown age of the mynas brought into captivity and the small samples dictate that only descriptive statements can be made concerning changes in iris colour and pattern over the observation periods. Five of the seven juveniles had grey irises when brought into captivity; in one the iris was grey with a brown outer ring (juvenile 5; Table 3), that of juvenile 7 was brown. Two had no stars at

TABLE 3

Eye colour categories (see text), recorded each week, of seven Common Mynas *Acridotheres tristis* caught as juveniles and kept in captivity for up to 17 weeks: 'm' = mottling or indistinct stars in the iris.

| Week | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|-------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Juv 1 | 1 | 1m | 1 | 1m | 3m | 3m | 3m | 3 | 3m | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Juv 2 | 1 | 1 | 1m | 3m | 3m | 3m | 3m | 3m | 3m | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Juv 3 | 1m | 1m | 1m | 3m | 3m | 3m | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Juv 3 | 1m | 1m | 1m | 1m | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | | | |
| Juv 3 | 3m | | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Juv 6 | 1m | 3m | 3m | 3m | 3m | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | | |
| Juv 7 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |

the time of capture; four had mottled markings in the grey iris suggesting an early stage of star formation and one bird, juvenile 7 with a brown iris, already had stars. Juveniles 1 and 2 initially had grey irises without stars. They developed mottling in the iris within three weeks of capture and these birds, along with the three that had mottling at the time of capture, progressed to form initially indistinct stars and finally discrete stars within 3–7 weeks. During the same period, the five birds that initially had grey irises developed brown rings around the pupil, around the outer margins of the iris, or both. In two of these, red mottling began to appear within the brown rings, while in a third the brown outer ring became dark grey.

Throughout the 17 weeks in captivity, all of the juveniles retained a completely yellow mandible, with no signs of development of a dark patch typical of adults.

The four adults retained the same basic colour patterns throughout the study, but with minor variations in the distribution of colour and possibly intensity of brown, red-brown and red; apparent colour intensity can, however, vary with ambient light, especially in photographs. In two birds the pattern of stars remained the same, but in one with very few stars, the number varied between three and four during the first eight weeks of recording, then settled at four for four weeks and then five stars for the last six weeks. The final adult had multiple stars on 1 November 2010–3 January 2011, a single row of stars on 12–31 January, multiple stars on 7 February and single stars from 14 February until the last observation on 2 March.

Discussion

The data collected on iris appearance in Common Mynas on Denis and North Islands revealed considerable variation in colour and its distribution, and in the pattern of stars within the iris. The objective of the analyses was to attempt to determine whether any of this variation was attributable to age, sex, reproductive state or body condition.

All-grey irises were almost confined entirely to juveniles. Similarly, lack of stars in the iris was largely a characteristic of juvenile mynas. Observations of the small sample of captive birds showed that juveniles with initially grey irises gradually developed mottling within the grey, and the acquisition of brown and / or red coloration and some stars (Table 3). In all of the captive juveniles, these changes occurred while the all-yellow bill remained devoid of any darkening at the base of the mandible, indicating that the latter characteristic of young birds persists for at least 17 weeks (the max. duration that birds were held in captivity), while the all-grey iris changed within this timescale.

However, associations between iris colour / pattern and breeding status, moult stage and body condition proved non-significant. There is thus no clear indication of functionality

for the variation in iris characteristics. During the first phase of the eradication attempt on Denis Island, we obtained circumstantial evidence that some individual mynas proved more attractive than others when used as live decoys to lure mynas into traps. If iris characters could be used to identify potentially attractive decoy birds, this could be used as a tool to aid future eradication attempts. Further studies on the significance of the changes in star pattern in myna behaviour, possibly facilitating individual recognition or hormonal status, represents an avenue to explore if the hypothesis that some individuals make more attractive decoys than others is confirmed.

Among the captive juveniles both brown and red pigmentation became apparent during the early stage of change in iris colour. However, from this study we are unable to state when fully grown birds develop their full eye coloration or whether it persists for life. The four captive adults retained the same basic colour pattern during their 17 weeks in captivity, but longer term observations on a larger sample are needed to address these points, and especially to determine whether iris colour and pattern in juveniles can be used to estimate their age, as is the case in some other passerines (e.g. Bearded Tits *Panurus biarmicus*: Wilson & Hartley 2007).

The captive juveniles showed that stars begin to appear in the iris during the first few weeks of life. In one of the birds, the number of stars varied during the period in captivity, and in later life variability in star pattern was indicated by the significantly greater proportion of adults with multiple stars in the samples collected on Denis Island in the breeding than in the non-breeding period. This could indicate that star pattern might be influenced by hormone cycles, a possibility also suggested by the significant association between two of the iris colour and pattern stages and gonad size in female mynas. However, this possibility requires substantiation via long-term studies of captive birds and experimental studies involving manipulation of hormone levels. Unlike flecks in the irises of several species of oystercatcher *Haematopus* spp., which are sex-linked (Guzzetti *et al.* 2008), the stars observed in myna irises and their apparent seasonal variation occur in both sexes, but what the stars are, in terms of pigmentation or lack of it, is unknown.

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A new North African subspecies of Common Chaffinch *Fringilla coelebs*

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SUMMARY.—A new subspecies of Common Chaffinch *Fringilla coelebs* in North Africa is described. It is restricted to northern Cyrenaica in north-east Libya. Differences from the other North African subspecies, *F. c. africana* and *F. c. spodiogenys*, are discussed, the main ones being that males invariably possess a prominent white patch on the central nape, a hint of a white post-ocular supercilium, a more yellowish tinge both above and below, stronger yellow fringes to the tertials and wing-coverts, and a less clean blue-grey head. Reasons for not recognising the subspecies *F. c. koenigi* are reconfirmed. There is some variation in size and in saturation of male plumage within the range of *africana*, making separation of *koenigi* untenable.

Common Chaffinch *Fringilla coelebs* is an abundant and widely distributed polytypic species. Geographical variation is manifest in the large number of described subspecies which, based on their external characteristics, are often conveniently arranged in three subspecies groups: (i) a continental Eurasian group, (ii) a North African group and (iii) a north-east Atlantic Islands group. These groups differ sufficiently to have been suggested to possibly constitute two or even three species (C. S. Roselaar *in* Cramp & Perrins 1994). However, because genetic analyses demonstrate that *spodiogenys* of Tunisia is sister taxon to all other examined Chaffinch populations, and that *africana* of Morocco and Algeria is closer to European *coelebs* than to *spodiogenys* (Marshall & Baker 1999), it appears better to maintain all three subspecies groups as one species, to avoid creating potentially non-monophyletic species.

Within the North African group two subspecies are generally recognised, *africana* (Morocco east to west Tunisia, and—as generally maintained—again in north-east Libya), and *spodiogenys* (east Tunisia, north-west Libya). A third subspecies, *koenigi* (north-west Morocco) has been described, but is generally considered to be a synonym of *africana*. It is within this North African group that a new subspecies is proposed.

Material

Specimens of all Chaffinches collected in North Africa as breeders, or estimated from their appearance to belong to the various African subspecies, were examined in the following collections: Natural History Museum, Tring (NHM), American Museum of Natural History, New York (AMNH), Museum für Naturkunde, Berlin (ZMB) and Naturhistoriska Riksmuseet, Stockholm (NRM). A few specimens were also provided on loan from Istituto Superiore per la Protezione e la Ricerca Ambientale, Bologna (ISPRA). The total number of specimens examined of each taxon is presented in Table 1.

Results and Discussion

Subspecies *F. c. spodiogenys* was described in 1841 by Bonaparte from near Tunis and south to Sfax in Tunisia, i.e. the east of the country. The local population breeding in north-

TABLE 1
Numbers of individuals of North African Chaffinch *Fringilla coelebs* taxa examined for this study, taxa arranged from west to east.

| | ♂ | ♀ | Totals |
|---------------------------------|-----|----|--------|
| <i>F. c. africana</i> | 128 | 23 | 151 |
| <i>F. c. spodiogenys</i> | 51 | 18 | 69 |
| <i>F. c. harterti</i> ssp. nov. | 18 | 8 | 26 |
| Totals | 197 | 49 | 246 |

west Tripolitania, Libya, is usually also referred to this subspecies (Isenmann *et al.* 2005). This race is large and quite pale pink below, has a green mantle and back (corresponding in Ridgway 1912 to either Asphodel Green or Pois Green, both on Pl. 41) and comparatively pale lead-grey crown, nape, shoulders, cheeks and neck-sides (Light Alice Blue, Pl. 34). About 25% of males have a very small white patch on the back of the neck, and another 25% an even fainter hint of such a patch, more or less concealed under pale lead-grey feathers and only visible if these feathers are disordered. There is a narrow white eye-ring (divided at fore and rear), but no white patch or streak behind the eye except a hint in some. The double wingbars and tertial edges are generally pure white (when fresh sometimes faintly tinged yellow). There is much white in the outertail.

Subspecies *F. c. africana* was described by Levaillant. The year of publication is customarily stated to be 1850, but some uncertainty exists regarding the date (Dickinson & Christidis 2014). Its range covers the major part of north-west Africa from Morocco to west Tunisia. If sufficient material is examined, it is evident that this subspecies varies individually and geographically to some extent, a fact that must be borne in mind when assessing subspecies taxonomy. Birds in the north-west tend to be smaller and darker than those in the south, which are larger and paler. Although typical birds are rather saturated cold vinaceous-pink below, a few are paler and tend towards *spodiogenys*.

Breeders around Tangier in extreme north-west Morocco are very subtly smaller and darker than average *africana*, and have been named *koenigi* (Rothschild & Hartert 1893). However, the size difference is small, with large overlap with breeders in south Morocco or north Algeria, and most specimens from around Tangier do not differ in colour or darkness from breeders elsewhere in northern Africa, thus *koenigi* is best considered synonymous with *africana*, an arrangement adopted by Meinertzhagen (1940: 132), Vaurie (1956, 1959), Paynter (1968), C. S. Roselaar *in* Cramp & Perrins (1996), Thévenot *et al.* (2003), Dickinson (2003) and Dickinson & Christidis (2014). This also accords with the so-called 75% rule, wherein at least three-quarters of all individuals of at least one sex must differ diagnosably from adjacent subspecies (e.g. Amadon 1949), which rule is applied to subspecies distinction in the forthcoming *Handbook of Western Palearctic birds* (Shirihai & Svensson *in press*).

A series collected in autumn in the southern Algerian Atlas Mountains (Djelfa) by C. B. Ticehurst and H. Whistler in 1937 (in NHM) tend to be large, large-billed and paler below than typical *africana* from the Algier region, and it is tempting to view these as a potential separate subspecies. Yet, when a large sample from the Algerian Saharan Atlas was assessed, especially those in AMNH and NRM with birds from Biskra, Batna and Lambèse, all kinds of intermediates and transitional plumages appear to bridge the appearance of the Djelfa series with more typical *africana*. There is a tendency for breeders in the Saharan Atlas to be slightly larger and paler than northern birds, but the difference is far from distinct with much overlap.

In summary, breeders in Morocco, Algeria and western Tunisia, *africana*, are in more than 75% of examined specimens slightly darker and smaller than *spodiogenys* in east Tunisia, have a darker blue-grey crown and nape and, on average, more extensive black on the lores and forehead, with the pink of underparts usually darker. However, due to clinal and rather extensive individual variation in size and colours within *africana* it seems best not to recognise further subspecies within this region.

The local and isolated population in north-east Libya (Cyrenaica) was included within *spodiogenys* by Hartert (1923), but since then has usually been treated within *africana* (e.g. by Paynter 1968, who stated that the Libyan population is 'indistinguishable' from *africana*, and by Collar *et al.* 2010, but see below). Fry & Keith (2004) considered that it was unresolved as to which subspecies the Cyrenaican breeders are best referred to.

During preparatory work for a forthcoming handbook (Shirihai & Svensson in press), I was struck by the distinctiveness of the Cyrenaican population. Inclusion of these breeders in *africana* would be odd irrespective of morphology, as they would represent an isolated population, with a different and paler subspecies (*spodiogenys*) between them and the rest of the range of *africana*, c.1,200 km away. Morphological differences from *africana*, as will be demonstrated, are on the same level as those separating *africana* from *spodiogenys*, leading me to name the Libyan population:

Fringilla coelebs harterti, subsp. nov.

Holotype.—Adult male, AMNH 709744, collected by E. Hartert and C. Hilgert, near Al Marj ('Merg') c.85 km north-east of Benghazi and c.18 km from the coast, in north-east Libya, on 8 May 1922. Sex and age are indicated on the label and also evident from plumage colours, shape of tail feathers and wear. Measurements: wing length (max.) 95 mm, tail 77 mm, tarsus 19.6 mm, bill to skull 17.0 mm, bill depth at feathers 9.0 mm. Upperparts and head as in *spodiogenys* but has a more distinct white nuchal patch, a small white post-ocular patch (appearing as a rear extension of the upper 'eyelid' in the broken white eye-ring), further the lead-grey crown and nape are slightly darker and less pure, the mantle is not pure green but has a brownish or bronzy tinge, the lead-grey shoulders are less extensive, and the tertial and inner greater covert fringes are partly tinged pale lemon-yellow. Underparts are paler than in *africana* but not as pale as in typical *spodiogenys*, and differ from both by having a faint yellowish-buff tinge to the pink. Bill long, 1.3 mm longer than the mean for *africana* and 1.4 mm longer than that for *spodiogenys* (Table 2; Figs. 1–3).

Label.—On one side in print: 'W. Rothschild, E. Hartert & C. Hilgert, Coll.', although 'W. Rothschild' has been crossed out with ink. In ink also 'FRINGILLA coelebs spodiogenys!' and stamped 'AM. MUS. NAT. HIST. NO.' and in ink '709744'. On other side: in print 'Rothschild Museum'. Further 'MERG, Cyrenaica, Date: 8/5/1922. Sex: ♂ ad. Iris: brown Bill: pale blue, tip black Feet: dark greyish brown.'

Distribution.—Restricted to north Cyrenaica wherever there is suitable habitat, i.e. woods, orchards or gardens, from sea level to c.500 m on Gebel Akhdar, with specimens from Al Marj (Merg), Wadi el Kuf, Barqah (Barce), Tükrah (Tocra), Maraua, Cyrene and Messa. Apparently not in Tripolitania (north-west Libya), and does not occur east of Darnah (Derna) (Stanford 1954).

Diagnosis.—Differs from similarly sized *spodiogenys* of east Tunisia in that male plumage is darker above and below, being as dark as the smaller *africana* but warmer above than the majority of *africana*, less cold blue and green, with the green mantle more tinged golden-brown, especially when fresh ('Deep Grape Green', Pl. 41, or 'Dull Citrine', Pl. 16 in Ridgway 1912). Extension of bluish or lead-grey on shoulders somewhat narrower than in



Figure 1. Dorsal view of males of three subspecies of Common Chaffinch *Fringilla coelebs*, three of each. From left, *F. c. africana*, *F. c. spodiogenys* and *F. c. harterti* ssp. nov. Note in *harterti* the obvious white nuchal patch, less pure lead-grey crown and nape, slight brown tinge to mantle, and more limited grey on the scapulars. Note also overall paleness of *F. c. spodiogenys*. The third specimen from the right is the holotype of *harterti*. Of the slightly more variable *F. c. africana*, the three examples are all from spring (late March–late May) and represent, from left to right, the palest birds, from Batna, Algeria, an average dark bird, from western Morocco, and a small, dark bird from Tangier ('*koenigi*') (Lars Svensson / © American Museum of Natural History, New York)



Figure 2. Same specimens as in Fig. 1, ventral view. From left *F. c. africana*, *F. c. spodiogenys* and *F. c. harterti* ssp. nov. Note in *F. c. harterti* intermediate darkness of pink, the pink having a slightly warmer shade than in the other two. Again, note overall paleness of *F. c. spodiogenys* (Lars Svensson / © American Museum of Natural History, New York)

TABLE 2

Biometrics of North African Chaffinch *Fringilla coelebs* taxa, listed from west to east. Measurements (mm) taken by the author, following standard protocols established in Svensson (1992). *n* = sample; **bold** numbers refer to mean values; \pm = standard deviation; W = wing length from carpal, maximum stretched and flattened; T = tail length; bill measured to skull (s); T/W = ratio between tail and wing lengths expressed as a percentage; BD (f) = bill depth at feathering; total length taken only from well-prepared specimens.

| ♂♂ | <i>n</i> | T | T/W | Tarsus | Bill (s) | BD (f) | Total length | |
|---------------------------------|----------|-------------|-------------|-------------|-------------|-------------|--------------|--------------|
| <i>F. c. africana</i> | 128 | 81–97 | 60–78.5 | 72.1–83.5 | 18.0–20.5 | 13.5–16.6 | 7.4–9.7 | 139–185 |
| | | 89.8 | 70.4 | 78.3 | 19.3 | 15.1 | 8.4 | 157.6 |
| | | ± 3.33 | ± 3.66 | ± 2.28 | ± 0.52 | ± 0.71 | ± 0.41 | ± 8.42 |
| <i>F. c. spodiogenys</i> | 51 | 86–97 | 66–79 | 72.1–83.2 | 17.5–19.9 | 13.6–16.4 | 7.7–9.5 | 150–177 |
| | | 91.1 | 71.4 | 78.3 | 18.9 | 15.0 | 8.4 | 163.9 |
| | | ± 2.60 | ± 3.11 | ± 2.18 | ± 0.57 | ± 0.77 | ± 0.37 | ± 5.95 |
| <i>F. c. harterti</i> ssp. nov. | 18 | 89–95 | 67–79 | 75.3–85.6 | 18.0–21.6 | 14.3–18.0 | 8.5–9.7 | 155–170 |
| | | 91.6 | 73.6 | 80.4 | 19.5 | 16.4 | 9.1 | 163.1 |
| | | ± 1.87 | ± 2.95 | ± 2.35 | ± 0.87 | ± 0.84 | ± 0.38 | ± 4.40 |
| ♀♀ | | | | | | | | |
| <i>F. c. africana</i> | 23 | 80–88 | 61.5–68.5 | 74.1–80.5 | 17.5–20.0 | 14.0–15.9 | 7.3–8.9 | 138–155 |
| | | 84.2 | 65.4 | 77.7 | 18.9 | 15.2 | 8.2 | 146.6 |
| | | ± 1.95 | ± 1.87 | ± 1.65 | ± 0.60 | ± 0.46 | ± 0.47 | ± 5.30 |
| <i>F. c. spodiogenys</i> | 18 | 81–93 | 63–72.5 | 73.1–84.1 | 17.2–19.8 | 14.0–16.4 | 7.5–8.9 | 147–172 |
| | | 85.3 | 66.6 | 78.1 | 18.7 | 15.0 | 8.2 | 156.2 |
| | | ± 2.98 | ± 2.50 | ± 2.89 | ± 0.74 | ± 0.62 | ± 0.32 | ± 6.96 |
| <i>F. c. harterti</i> ssp. nov. | 8 | 84–87 | 67–68 | 77.0–81.0 | 17.8–20.3 | 14.3–17.4 | 8.2–9.6 | 145–158 |
| | | 85.3 | 67.8 | 79.5 | 18.9 | 15.7 | 9.0 | 154.0 |
| | | ± 1.04 | ± 0.46 | ± 2.35 | ± 0.83 | ± 0.88 | ± 0.45 | ± 4.34 |

both other subspecies. Underparts of males pale pink, clearly paler than *africana* but subtly darker than in *spodiogenys*, and differing from both in that the pink has a faint yellowish-buff tinge. Further differs by having a heavier bill than both, by invariably having a small but generally distinct white nuchal patch (present in 19% of *africana* and 57% of *spodiogenys*, but generally fainter and smaller). A small narrow white patch behind eye is present in nearly all males. Also, the pale innermost greater covert and tertial fringes tend to be purer pale lemon-yellow (whiter in both other taxa), often even visible in more bleached spring plumage. Compared to male *africana*, lores and cheeks tend to be less neatly blue-grey, more sullied brown-grey. More long-legged especially compared to *spodiogenys*.

Females of all Chaffinch subspecies are more similar and less easy to separate than males, but female *harterti* differs from others in North Africa in being subtly more yellowish or ochre-tinged both above and below. Like males, the tips and fringes of the greater coverts and tertials tend to show more pale yellow than in the other races (Fig. 4).

Etymology.—The new name refers to the fact that in 1922 Ernst Hartert, together with C. Hilgert, made a significant effort to investigate the avifauna of northern Cyrenaica, where they collected the holotype. It also honours one of the founders of modern avian taxonomy.

Previous observations.—I am not the first to have noted the distinctiveness of the Chaffinches in north Cyrenaica. J. K. Stanford visited northern Cyrenaica in March–May 1952 with the objectives of studying spring migration and collecting birds for NHM. He collected eight males and five female Chaffinches and noted (1954): ‘One of the commonest birds of the Gebel el Akhdar, occurring from sea level near the Tükrah pass eastwards to



Figure 3. Same specimens as in Fig. 1, lateral view. From left *F. c. africana*, *F. c. spodiogenys* and *F. c. harterti* ssp. nov. Note in *F. c. harterti* slightly less pure blue-grey head and tendency to show more lemon-yellow on tertial fringes (Lars Svensson / © American Museum of Natural History, New York)



Figure 4. Females of three subspecies of Common Chaffinch, lateral view. From left two *F. c. africana*, two *F. c. harterti* ssp. nov. and one *F. c. spodiogenys*. Note in *F. c. harterti* slightly more lemon-yellow on tertial fringes, especially on the right-hand specimen, and a tendency to be warmer and buffier in general (Lars Svensson / © American Museum of Natural History, New York)

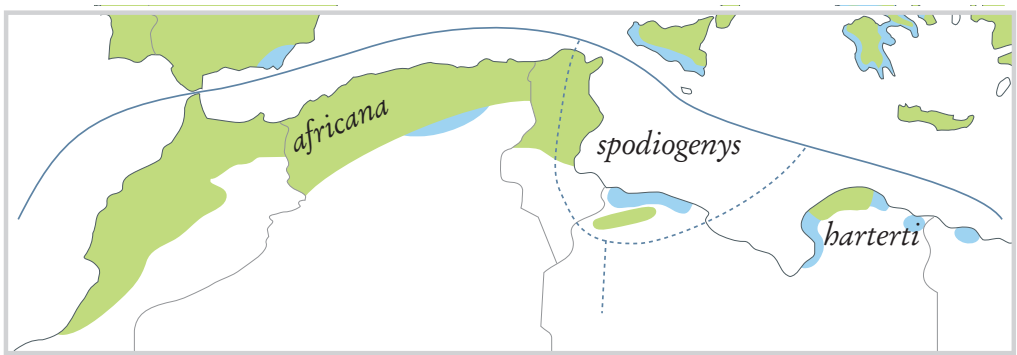


Figure 5. Breeding ranges of North African taxa of Common Chaffinch *Fringilla coelebs*. Map based on the literature cited and examination of specimens, and prepared by Magnus Ullman.

Darnah, where it is scarce. I have seen none further east. In the centre of the Gebel it is very common in woodland, gardens and scrub. [...] The song is shorter and rather weaker' [than of the British race] 'without the terminal flourish.' He concluded with a comparison between the series of breeders in Cyrenaica with *africana* and *spodiogenys*: 'This series differs from both in the size and shape of the bill, which is noticeably longer and more pointed. [...] In richness of colour the Cyrenaican series is closer to *africana* and differs from it only in that the females have rather greener mantles and there is a tendency for both sexes to have a yellow suffusion on the underparts and in the white of the wings...'. 'All the males have white bases to the grey feathers of the back of the head which show through as an occasional white fleck. This seems an individual character in North African Chaffinches but more common in the east than in the west.' Despite these acute observations, Stanford was content to include his series in the geographically distant *africana*.

At NHM, a former curator of the Bird Room, Derek Goodwin, made numerous notes left in trays and on the inside of cabinet doors regarding the morphology of certain subspecies or geographical populations. According to the current collections manager, R. Prÿs-Jones (*in litt.* 2014), these notes were made in the early 1970s when the collection was moved from central London to Tring. Concerning the series of Chaffinches from Cyrenaica, Goodwin had noted: '*Fringilla coelebs*, nr *spodiogenys*. Cyrenaica. Our Cyrenaican specimens seem nearest *spodiogenys* although averaging a little darker, & they have slightly larger bills.'

Finally, C. S. Roselaar (*in Cramp & Perrins 1994*) was tempted to treat the Cyrenaican birds as a separate race: 'Birds from Cyrenaica ... have longer bill than those from remainder of North Africa, colour near to *africana*, but underparts tinged yellow-buff instead of white, and white nape-patch large (Stanford 1954); here included in *africana*, following Vaurie 1959, but perhaps separable.'

In summary, the north Cyrenaican breeders of Chaffinch are as morphologically distinct from *spodiogenys* and *africana*, respectively, as these latter two are from each other, justifying recognition of *harterti*.

Conclusion

The following subspecies of Chaffinch in North Africa should be recognised, listed chronologically (see Fig. 5):

Fringilla coelebs spodiogenys Bonaparte, 1841. Type locality: Tunisia near Tunis and Sfax.

Fringilla coelebs africana Levaillant, 1850. Type locality: Algeria.

Fringilla coelebs harterti Svensson 2015. Type locality: near Al Marj, north Cyrenaica.

Given that *africana* is more closely related to *coelebs* than to *spodiogenys* (see above), it would be interesting to know the position of *harterti* within a revised genetic tree.

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First record of Subtropical Pygmy Owl *Glaucidium parkeri* in the Colombian Andes

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The enigmatic Subtropical Pygmy Owl *Glaucidium parkeri*, an uncommon and recently described species (Robbins & Howell 1995), is known from scattered records in the east Andean foothills and subtropics from Ecuador to Bolivia (Hennessey *et al.* 2003, Freile & Castro 2013). The first records in Ecuador and Peru date from the 1960s and 1970s, but confusion with Andean *G. jardinii* and Least Pygmy Owls *G. minutissimum* resulted in the species not being formally described until three decades later (Robbins & Howell 1995). However, it is unsurprising that the species' range is larger than realised, given predictions of its more continuous distribution and that many owls are so poorly known (Robbins & Howell 1995, Freile & Castro 2013).

The slopes of the Colombian Andes are still incompletely known. For example, recent work in remote parts of the central and northern Andes produced several new distributional records for Colombia (Salaman *et al.* 2002, Freeman *et al.* 2011, Olaciregui & Guzmán 2011), even species new to science (Robbins & Stiles 1999, Krabbe *et al.* 2005). In particular, few data exist on the avifauna of the southernmost departments of Nariño and Putumayo due in part to political instability (Calderón-Leyton *et al.* 2011, Sánchez-Cuervo & Aide 2013).

In 2010, the Corporación para el Desarrollo Sostenible del Sur de la Amazonía (CORPOAMAZONIA) initiated a project to search for potential Important Bird Areas (IBAs) in dpto. Putumayo, with the Sibundoy Valley being one of the areas submitted as a new IBA (Acevedo-Charry 2014). Here, coca crop eradication programmes have resulted in some natural forest regeneration, but gold mining presents new threats to biodiversity (Sánchez & Aide 2013). A workshop aimed at building local capacity in bird observation took place in 2013 (Gutiérrez-Zamora *et al.* 2013, Acevedo-Charry 2014). Following this, observers from the Sibundoy Valley Birdwatching Club began sending photographs and field notes to OAA-C.

On 18 January 2014, AC, BC-J, WDD & JJ were observing birds between San Francisco and Mocoa, Putumayo (01°04'N, 76°48'W; 1,800 m), where, c.15 km east of the main road, they observed and photographed a pygmy owl (Fig. 1) that was tentatively identified as *G. jardinii*. It was subsequently identified as Subtropical Pygmy Owl (by JFF) due to its prominent white coronal



Figure 1. Subtropical Pygmy Owl *Glaucidium parkeri*, Sibundoy Valley, dpto. Putumayo, south-east Colombia, 18 January 2014 (Judit Jaramillo)

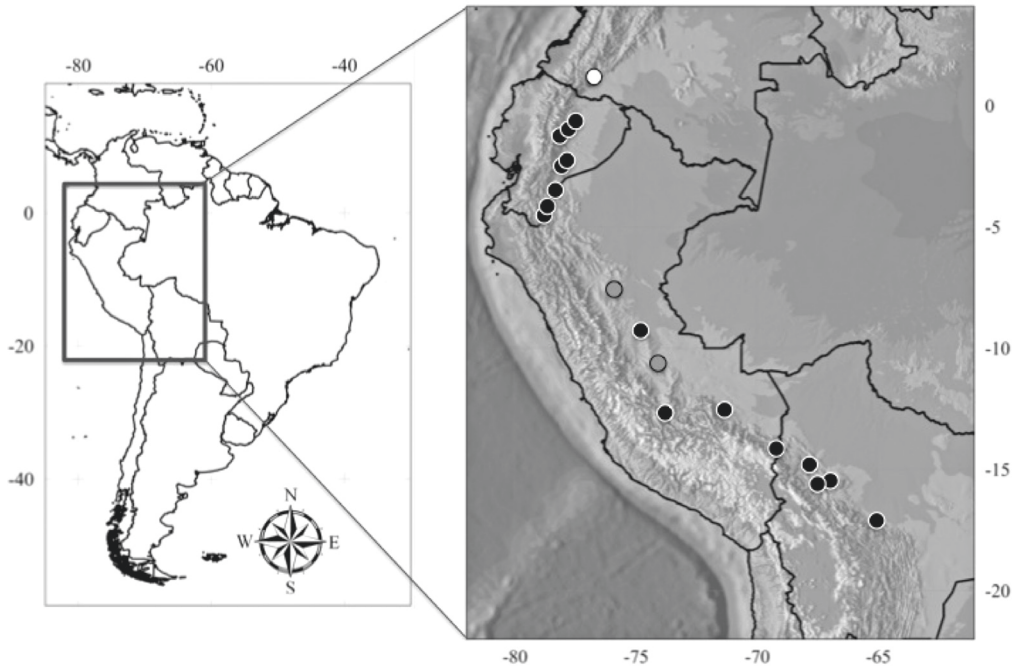


Figure 2. Distribution of Subtropical Pygmy Owl *Glaucidium parkeri* in South America: black dots indicate published localities (Robbins & Howell 1995, Hennessey *et al.* 2003, Walker *et al.* 2006, Freile & Castro 2013, Robbins *et al.* 2013), grey dots those available on xeno-canto (www.xeno-canto.org: XC152822, XC62899, XC628998) and the white dot the first record for Colombia (Sibundoy Valley, Putumayo).

spots, dark greyish-brown head, proportionately short tail and proportionately smaller head compared to *G. jardinii* (*cf.* Robbins & Howell 1995, Schulenberg *et al.* 2007). Although no sound-recordings were made, habitat and elevation also point to *G. parkeri*. The bird was perched in the subcanopy of a tree 18 m tall, for >5 minutes before it flew off. Habitat was similar to that at other known localities for *G. parkeri* (Robbins & Howell 1995, Freile & Castro 2013), with creek slopes *c.*45°. Playback of *G. jardinii* by OAA-C in the Sibundoy Valley yielded no response, but his field work did not include areas below 2,000 m elevation (Acevedo-Charry 2014), at which altitude *G. jardinii* and *G. parkeri* apparently replace one another (Robbins & Howell 1995, Freile *et al.* 2012).

G. parkeri is known from *c.*20 localities (Robbins & Howell 1995, Hennessey *et al.* 2003, Walker *et al.* 2006, Freile & Castro 2013, Robbins *et al.* 2013). Although some authors have suggested that the species might be continuously distributed over the entire Andean foothills from northern Peru to southern Colombia, there are no previous records from outlying ridges in northern Peru, or the Andes of north-east Ecuador and south-east Colombia (Fig. 2). Our record from the Colombian Andes is therefore not entirely unexpected given the species' continuous range in eastern Ecuador and the lack of evident geographic barriers between the northernmost Ecuadorian record, *c.*200 km to the south-west, at Cascada San Rafael, Napo (Ridgely & Greenfield 2001), and the Sibundoy Valley. This range extension is consistent with the discovery of many east slope or Napo endemics in the East Andes of southern Colombia in recent years (Salaman *et al.* 2002, Donegan *et al.* 2010, Olaciregui & Guzmán 2011).

It seems probable that *G. parkeri* ranges further north in the East Andes of Colombia, but has been overlooked due to its apparently low population density, the fact that its voice

was poorly known until recently and the species is not vocal for much of the year (Robbins & Howell 1995). The natural history, habitat, ecological interactions, population dynamics and distribution of several owl species, including *G. parkeri*, in the northern and central Andes are still very poorly known (Freile *et al.* 2012).

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Bluish-fronted Jacamar *Galbula cyanescens* in Ecuador

by Dušan M. Brinkhuizen, Giovanni Soldato, Greg Lambeth, Dave Lambeth,
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Bluish-fronted Jacamar *Galbula cyanescens* occurs south of the Amazon River from northern Peru and western Brazil south to northern Bolivia (Tobias *et al.* 2002). Its taxonomic status has been controversial, being treated as a subspecies of White-chinned Jacamar *G. tombacea* by some authors (Pinto 1938), and evidence for species rank is rather weak (Remsen *et al.* 2014): plumage differences between the two are subtle and their ranges are apparently mutually exclusive (Tobias *et al.* 2002, Schulenberg *et al.* 2010). *G. cyanescens* has sometimes been treated as part of the Ecuadorian avifauna on the basis of a 19th-century specimen taken in the Zamora area (Haffer 1974). However, Ridgely & Greenfield (2001) suggested that this specimen probably involved a Coppery-chested Jacamar *G. pastazae*, the only jacamar known to occur near Zamora.

Here we report recent field observations of *G. cyanescens* in the Nangaritza Valley of south-east Ecuador (Freile *et al.* 2013), along with the rediscovery and re-examination of the Zamora specimen. These records represent firm evidence of its occurrence in Ecuador. The species was previously thought to occur only south of the Marañón River (Tobias *et al.* 2002, Schulenberg *et al.* 2010).

Field observations

On 3 January 2013, DMB, GL, DL & NJA heard a *Galbula* jacamar calling from forest edge c.2 km west of Paquisha, prov. Zamora-Chinchipec (03°56'23"S, 78°41'35"W). DMB initially assumed it was a *G. pastazae*, a species regularly recorded in the foothills of eastern Ecuador. However, once the bird was in view several plumage characters were noted that did not match this species. It had a pale orange rather than rufous belly and lacked the yellow orbital ring of *G. pastazae*. DMB realised it must be a female *G. tombacea* or *G. cyanescens*. Neither species was expected at the site. Schulenberg *et al.* (2010) was consulted in the field. After playback of pre-recorded calls of *G. cyanescens* a male flew in and it became clear that the birds were paired. Both individuals had an iridescent bluish-green forehead, a field mark indicative of *G. cyanescens* (Schulenberg *et al.* 2010). GL & DMB obtained photographs (Fig. 1).

Subsequent observations at the same locality suggested that the birds were territorial. DMB, GL & DL observed the male on 6 January 2013. DMB, J. Nilsson & F. Witebsky returned on 28 July 2013 and obtained brief views of the pair. R. Ahlman photographed the female on 6 December 2013 and again observed the pair on 27 December. C. Vogt observed the pair on 2 February 2014. During all observations, the pair showed territorial behaviour by responding vocally to playback. Habitat at the site consisted of humid secondary forest at c.1,000 m elevation along a dirt road bordering extensive pastures, while a roadside bank may have provided a nest site, although no hole was found. The identification has been accepted by the Committee of Ecuadorian Records in Ornithology (CERO; Freile *et al.* 2013).

Identification.—*G. cyanescens* is very similar to *G. tombacea*. Plumage differences are subtle and their vocalisations are effectively indistinguishable (Schulenberg *et al.* 2010). The main (and perhaps only) difference between them is the colour of the head. *G. cyanescens* has an iridescent bluish-green crown, which is often more bluish on the forehead. In contrast, *G.*



Figure 1. Male and female Bluish-fronted Jacamar *Galbula cyanescens*, near Paquisha, Zamora-Chinchipe, Ecuador, 3 January 2013 (G. Lambeth)



Figure 2. Specimen no. 217 of Bluish-fronted Jacamar *Galbula cyanescens* collected by E. Festa in the Zamora region, south-east Ecuador, and deposited in the Turin museum (G. Soldato)

tombacea has a dull greyish-brown forehead and face (Ridgely & Greenfield 2001, Tobias *et al.* 2002, Schulenberg *et al.* 2010). *G. pastazae* also has a bluish-green crown, but is larger and both sexes possess a distinct yellow orbital ring. In addition, female *G. pastazae* has a large rufous throat patch (Ridgely & Greenfield 2001, Tobias *et al.* 2002, Schulenberg *et al.* 2010).

The habitat and location also support *G. cyanescens* rather than *G. tombacea*. *G. cyanescens* occurs in a variety of habitats, including secondary forest and edges, and its range penetrates the foothills of the Andes (Tobias *et al.* 2002, Schulenberg *et al.* 2010). In Ecuador, *G. tombacea* is known solely from the northern lowlands away from the Andes, usually along streams in *várzea* forest (Ridgely & Greenfield 2001).

Festa's specimen

In 1895–96, Enrico Festa collected a *Galbula* in the Zamora area, but did not provide a precise locality (Salvadori & Festa 1900). Festa's specimen no. 217 was later checked by Salvadori, who identified it as *G. tombacea* (Salvadori & Festa 1900). However, he stated that the specimen notably differed from other *G. tombacea* specimens in Turin museum and that it actually matched the description of *G. fuscicapilla* (Sclater 1855), a form by then synonymised with nominate *G. tombacea* (Sclater 1882). Differences included larger size, golden-green crown and upperparts, and no blue tone below the brownish chin.

The specimen was recently relocated by GS in the Turin museum (Fig. 2). Although rather damaged, examination revealed a distinctive bluish-green crown and a faint, dull whitish chin. Forehead and crown are dull greyish brown in *G. tombacea* (both sexes), whereas *G. pastazae* has a bluish chin and throat (male) or a large rufous throat (female: Ridgely & Greenfield 2001, Schulenberg *et al.* 2010). The bill was shorter (40.5 mm) than the only *G. pastazae* in Turin (49.1 mm), and of three specimens at Museo Ecuatoriano de Ciencias Naturales, Quito (45.2–46.3 mm; mean 45.6 mm).

Discussion

Haffer (1974) re-identified the Zamora specimen as *G. cyanescens* based on Salvadori & Festa's (1900) description of a golden-green crown, but did not indicate whether he had examined the specimen himself. Due to the unclear whereabouts of the specimen, Ridgely & Greenfield (2001) were unable to test Haffer's assumption and suggested that it probably involved a *G. pastazae*, given that it is the only *Galbula* known from the Zamora area and this species also has a green crown.

Chapman (1926) was probably unaware of the specimen, despite having apparently seen Salvadori & Festa (1900) and even Festa's collecting itineraries. Although Haffer (1974) had already re-identified the specimen as *G. cyanescens*, the latter species was omitted from subsequent lists of Ecuadorian birds (Butler 1979, Ortiz-Crespo *et al.* 1990, Ridgely *et al.* 1998).

G. cyanescens and *G. tombacea* form a superspecies with Green-tailed Jacamar *G. galbula*, Rufous-tailed Jacamar *G. ruficauda* and Coppery-chested Jacamar, and are probably close relatives (Tobias *et al.* 2002, Remsen *et al.* 2014). Their geographical distributions are largely separated by the Amazon, but intermediate specimens have been reported from the Javari River, just south of the Amazon near the Colombia / Peru / Brazil border (Sclater 1857, 1882) and, besides the Ecuadorian records, *G. cyanescens* has been reported at two sites north of the Amazon, both in Colombia: Nauta (Haffer 1974) and near Leticia (Beckers & Flores 2013). Whether *G. cyanescens* and *G. tombacea* are in contact requires confirmation, but if they meet without interbreeding it would strengthen their status as separate species.

As both Ecuadorian records of *G. cyanescens* are from the south-eastern foothills, and *G. tombacea* is confined to *várzea* forests below 400 m, it is unlikely that they overlap in southern Ecuador. However, further data are required on the ranges of both species in the Pastaza and Santiago drainages, which remain poorly explored ornithologically (Freile *et al.* 2006).

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A new subspecies of Three-striped Warbler *Basileuterus tristriatus* in the Serranía de San Lucas, Colombia

by Paul Salaman

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A population of Three-striped Warbler *B. tristriatus* in the Serranía de San Lucas, dpto. Bolívar, northern Colombia, was discovered in 2001 (Salaman *et al.* 2001, 2002). It was immediately evident from their bright yellow coloration that these birds represented a new taxon, and the expedition reports considered that they 'may relate to an undescribed subspecies' (Salaman *et al.* 2001) and subsequently were considered 'to represent an undescribed subspecies' (Salaman *et al.* 2002). Two independent taxonomic studies (Gutiérrez-Pinto *et al.* 2012, Donegan 2014) have confirmed that this population differs in its molecular biology and voice. Gutiérrez-Pinto *et al.* (2012) concluded that Three-striped Warblers in San Lucas represent an 'undescribed subsp.' while Donegan (2014) also referred to the population as 'undescribed', but noted that Gutiérrez-Pinto *et al.* (2012) had declared an intent to do so. Following communication with all of the above-mentioned authors, confirming their lack of intention to proceed with a description of their own and their consent to this publication, I now propose that the San Lucas population be named:

Basileuterus tristriatus sanlucasensis subsp. nov.

Holotype.—Adult male, Instituto de Ciencias Naturales, Universidad Nacional, Bogotá, Colombia (ICN) no. 34167. Extracted from a mist-net by P. Salaman and prepared as a specimen by T. M. Donegan, at El Retén, near La Punta, Santa Rosa del Sur, Serranía de San Lucas, Bolívar (08°08'47"N, 74°12'48"W; 1,400 m) on 18 March 2001. The specimen is illustrated in Donegan (2012: Fig. 2).

Paratype.—Adult female, ICN 34178, mist-netted and prepared by P. Salaman on 19 March 2001 at the same locality as the holotype. Also illustrated in Donegan (2012: Fig. 2).

Diagnosis.—Available sound-recordings of *sanlucasensis* differ from those of other populations of *B. tristriatus* in having a shorter introduction to the rising song and in not attaining such low minimum acoustic frequencies in rising or slow songs (Donegan 2014: cf. Appendix 2 and sonograms in Figs. 3A and 4E thereof, alongside data pertaining to, and sonograms of, vocalisations of other *B. tristriatus* subspecies). Considered phenotypically distinct from other populations of *B. tristriatus* (Salaman *et al.* 2002, Gutiérrez-Pinto *et al.* 2012), except those in the northernmost Central Andes (part of *B. t. daedalus*: Donegan 2014). The new subspecies has yellower underparts and fore crown-stripe than adjacent populations of *B. tristriatus* (Salaman *et al.* 2002, Curson 2010), being closer in plumage to geographically distant and vocally differentiated populations on the east slope of the Andes in Ecuador and Peru (referred to *B. t. baezae* or *B. t. tristriatus*) in this character (Gutiérrez-Pinto *et al.* 2012). Gutiérrez-Pinto *et al.* (2012: 5) sampled mtDNA of the holotype and paratype, finding the San Lucas population to be 'significantly divergent from the adjacent populations of the Central ($\Phi_{ST} = 0.801$, $p < 0.005$; mean uncorrected distance = 0.046) and Eastern cordillera ($\Phi_{ST} = 0.816$, $p < 0.005$; mean pairwise difference = 0.039)', whose populations are ascribed to *B. t. daedalus* and *B. t. auricularis*, respectively; and found San Lucas specimens to form a phylogenetically basal group with respect to these two Andean populations (Fig. 3, clade D).

Description of holotype.—Colour descriptions follow Munsell Color (1977, 2000) and were taken by TMD from the holotype at ICN in January 2010. Sides of crown, lores and ear-coverts black (not coded). Crown-stripe yellow (5Y 7/8), paler (5Y 7/3) on nape and forecrown. Supercilium and lower eye-ring cream (5Y 7/2), moustachial off-white (5Y 8/1) with narrow darker moustachial stripe. Whitish (5Y 7/2) mark behind ear-coverts. Upperparts, fringes to tail and wing-coverts, and thighs and flanks olive (2.5GY 5/6 but darker). Wing-coverts, flight feathers and tail otherwise dusky (5Y 3/2), with leading edge of first primary paler (5Y 8/12). Chin cream (5Y 8.2), throat light yellow (5Y 8/2) and breast somewhat more fulvous (5Y 7.5/8) with very pale olive speckles. Belly yellow (5Y 8/8). Upper breast-sides olive (as back). Emarginations on second, third and fourth primaries (from the outermost), with slight emargination on fifth primary. Wingtip formed by third and fourth primaries. The specimen label bears the following data: iris dark brown, bill greyish horn, legs pale yellow-brown. Mass 12.4 g. Left testis 7.0 × 6.7 mm. Trace of fat. Skull ossified, stomach empty. Forest edge. 1,400 m. Colombian EBA Project EBA 01 #4.

Variation.—The paratype is marginally paler on its upper breast, has a paler olive mantle and is smaller bodied. The iris of an individual captured at Santa Cecilia, San Lucas, in 2010 was coded in the field as brown (2.5Y 2.5/2). Six individuals trapped by T. M. Donegan at the latter locality also had bright yellow underparts and crown (e.g. Donegan 2014: Figs. 1E–F). A photograph of the new subspecies in life appeared in Salaman *et al.* (2002: Fig. 3). Variation in biometrics is detailed in Appendix 1 of Donegan (2014) and in voice in Appendix 2 of Donegan (2014).

Distribution.—Occurs only in the Serranía de San Lucas (Salaman *et al.* 2001: Fig. 1; Salaman *et al.* 2002: Fig. 1) where known from two highland localities: La Punta (details above: see Salaman *et al.* 2001, 2002) and Santa Cecilia (*cf.* Donegan 2012, 2014). Recorded at 1,400–1,600 m, but doubtless ranges higher. Unrecorded at various low-elevation sites in San Lucas (Salaman *et al.* 2001), so unlikely to occur below 1,350 m, at least on the east slope of the massif.

Vocalisations.—See the diagnosis, discussion and sonograms in Donegan (2014: Figs. 3A, 5E and 7E–F).

Etymology.—Named for the Serranía de San Lucas. The name is based on the Spanish word for Saint (San) and the personal noun (Lucas), the beatified gospel author who gives his name to the range. The adjectival Latin suffix ‘-ensis’ (pertaining to or originating from) is invariable. The recommended English name is ‘San Lucas Warbler’ or in Spanish ‘Arañero de San Lucas’.

Taxonomic rank.—Treated as a subspecies following Gutiérrez-Pinto *et al.* (2012) and Donegan (2014). Clearly a phylogenetic species, with apparently deep molecular differentiation and some vocal differentiation from other populations. However, under the Biological Species Concept, the requirements of ‘species scoring’ tests for allopatric populations (Tobias *et al.* 2010) are not met, with estimated scores of 0 for plumage or biometrics (*vs.* the northernmost populations of *B. t. daedalus*), 2–3 for acoustic frequency differences and 1–2 for length of trill in male songs, giving a score of 3–5, i.e. fewer than the seven required for species status under the Tobias *et al.* system.

Conservation.—There is no protected area within the range of this population. It is of utmost urgency that conservation measures be designed to protect the Serranía de San Lucas. A discussion of the region’s conservation issues is set out in Salaman *et al.* (2001, 2002) and Donegan (2012).

ICZN Code of Ethics.—Although Gutiérrez-Pinto *et al.* (2012) stated an intention to describe this population, communications with all of these authors confirmed that none of them now intends to publish a description or wished to co-author this description. T. M.

Donegan declined to be an author because he did not want to participate in a description without any of Gutiérrez-Pinto *et al.* (2012). It is an important outcome that this population be described because taxonomic recognition of a first San Lucas endemic could help motivate long-outstanding conservation plans for the region. All of the persons mentioned in this paragraph fully support this description being published.

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A dark-morph White-bellied Storm Petrel *Fregetta grallaria* off Más Afuera (Alejandro Selkirk) Island, Juan Fernández archipelago, Chile?

by Hadoram Shirihai, Hernán A. Díaz M. & Vincent Bretagnolle

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Here we describe an intriguing dark *Fregetta* storm petrel observed in the Juan Fernández archipelago, and discuss its possible origin. During 3–15 March 2013, we mounted a research expedition to the Juan Fernández archipelago (Shirihai *et al.* in press), especially designed to study *Pterodroma* petrels at sea, as part of the Tubenoses Project & Extreme Gadfly Petrel Expeditions (Shirihai & Bretagnolle in prep.). Special foci of our research trips are studies of plumage variation, the pelagic distribution, foraging techniques and species associations, and in this case the birds' return to the breeding island of Más Afuera (Alejandro Selkirk). As far as we know, our expedition was the first of its type in the waters of the archipelago since the Brewster-Sanford Expedition, in December 1913, and the visit by Rollo Beck, in January 1914 (Murphy 1936), who collected petrels by using chum to attract them. During the c.1,800 km voyage, we targeted 12 strategic 'mass chumming' locations, with each session lasting 2–6 hours. Chumming was performed for a total 42.5 hours, using c.1 ton of frozen chum blocks, with each of the 70 blocks used comprising 10–15 kg of fish cuts, which we coupled on the sea surface with very dense fish oil. En route to and from the archipelago, the expedition also conducted chumming in the Humboldt Current, at the point where the continental shelf gives way to deeper waters.

Between 6 and 12 March 2013, we worked at sea around Robinson Crusoe and Más Afuera, mostly to the east, south and south-west of the islands (Shirihai *et al.* in press). The last chumming session off Más Afuera was on 12 March, at 13.30–17.30 h (33°53'11"S, 80°41'24"W; c.8.3 nautical miles south-west of the island), which resulted in ten tubenose species, including 5,000 Juan Fernández *Pterodroma externa* and 100 Stejneger's Petrels *P. longirostris*, attending the chum. We observed just two *F. grallaria* which fed constantly within the core of the chum slick, often close to our boat. During much of this period, HS was using only a Canon 1Dx camera and 300mm/2.8 lens, when, at c.16.00 h, he spotted a very small and apparently all-dark storm petrel that crossed between the main chum slick and the rear of the boat. When HS spotted the bird it was just 5 m from the boat, and he acquired a series of 12 sharp but small-sized images (*cf.* Figs. 1–2). Amazingly, notwithstanding that the chum slick was proving so attractive to other petrels, including two *F. grallaria*, this bird completely ignored the chum and continued until it was out of sight—it was not seen again.

We possibly saw another individual on 9 March while chumming off Más Afuera, although it could not be photographed. However, it looked very similar in coloration, structure and behaviour to the bird on 12 March.

Description

Size.—During the entire observation, the impression was of a tiny storm petrel, clearly smaller (at least in appearance) than *F. grallaria*, although they were not seen side-by-side, rather only flew close to one another. During the previous week, HS & HADM had seen up to 30 *F. grallaria* per day, so they had a good sense of comparative sizes at sea. Their impression was that it was not much larger than a Grey-backed Storm Petrel *Garrodia nereis*,



Figure 1. Dark White-bellied Storm Petrel *Fregetta grallaria*, off Más Afuera, Juan Fernández archipelago, 12 March 2013 (Hadoram Shirihai, © Tubenoses Project)

Figure 2. Flight sequence of dark White-bellied Storm Petrel *Fregetta grallaria*, off Más Afuera, Juan Fernández archipelago, 12 March 2013 (Hadoram Shirihai, © Tubenoses Project)

Figures 3–4. Depending on angle and flight mode, feet do not seem to project beyond the tail tip when seen from above, but just slightly from below; dark White-bellied Storm Petrel *Fregetta grallaria*, off Más Afuera, Juan Fernández archipelago, 12 March 2013 (Hadoram Shirihai, © Tubenoses Project)

Figure 5. Dorsal view of dark White-bellied Storm Petrel *Fregetta grallaria*, off Más Afuera, Juan Fernández archipelago, 12 March 2013 (Hadoram Shirihai, © Tubenoses Project)

Figure 6. Ventral view of dark White-bellied Storm Petrel *Fregetta grallaria*, off Más Afuera, Juan Fernández archipelago, 12 March 2013 (Hadoram Shirihai, © Tubenoses Project)





Figures 7–8. Dark White-bellied Storm Petrel *Fregetta grallaria* (left); White-bellied Storm Petrel *F. g. segethi* (right, a rather fresh adult in early stage of breeding, not a fresh juvenile, due to mixed feather ages with worn tips on back, and thus unlike the worn and moulting dark bird); both off Más Afuera, Juan Fernández archipelago, 12 March 2013 (Hadoram Shirihai, © Tubenoses Project)

or intermediate in size between the latter and local *F. g. segethi*, which is among the smallest population of White-bellied Storm Petrel (Brooke 2004).

Jizz and structure.—The bird appeared very compact and round-bodied (Fig. 3), its overall shape apparently closest to Grey-backed Storm Petrel. Most of the time (and on most images) the feet did not project beyond the tail tip, but at certain angles (and in two of the 12 photographs) the feet seem to project just slightly (Fig. 4). The tail mostly appeared square-and-straight-ended (e.g., Fig. 5) or to have a very shallow fork (Fig. 6).

Behaviour.—Similar brief approaches to chum (almost ignoring it) have been reported at certain times or localities by storm petrel species otherwise easily attracted to chum elsewhere, e.g. Matsudaira's Storm Petrel *Oceanodroma matsudairae* wintering over the Seychelles Bank (Shirihai & Skerrett in prep.) and 'Titan' Storm Petrels *F. grallaria titan* in French Polynesia (cf. Howell 2014). Thus, behaviour towards the chum or boats is not a guide to taxon, despite that it is often considered as a subsidiary clue in field guides.

Plumage

Overall dark above, with pale (creamy, marbled grey) 'U'-shaped rump patch. The latter was rather ill-defined and lacked any contrast, being relatively narrow (c.1/3 width of tail length; Fig. 5). Back and upperwing-coverts appeared darker than rest of the upperwing, while the head and mantle, plus throat to chest were darkest, almost dusky or ashy black (Figs. 5–6). Underparts also appeared mostly dark, but darkest were the chest and undertail-coverts/vent area, while the belly was paler, marbled whitish grey, with buffish-washed flanks (Fig. 6). Most of the underwing-coverts (including all lesser and median primary- and secondary-coverts) were solidly and contrastingly black, encompassing almost half of the underwing area; the greater-coverts (primary- and secondary-coverts, including the longer inner feathers near the body) were paler, forming a narrow dusky-grey panel between the blackish fore underwing-coverts patch and the otherwise dark remiges (Fig. 6).

Moult in relation to breeding cycle

As shown in, e.g., Fig. 7, the bird was in advanced moult, with numerous fresh and old (bleached brownish and worn) body feathers, had already shed the innermost primary, with a growing remex (already $c.2/3$ grown), while the other primaries were heavily worn and bleached (some with broken / ragged tips). There were also apparent moult limits among the rectrices and secondaries, with the latter's outermost block appearing clearly blacker (newer) and the inner ones browner (older), visible both above (Fig. 7) and below (Fig. 6). If these moult contrasts are real then the bird must have been an adult or immature (second-year or older) that had completed at least one previous moult cycle (prior to the present one). If an adult, such a pattern suggests that the bird had just finished or was about to finish breeding (presumed summer–autumn breeder). But, if the apparent moult contrasts in the tail and secondaries are artefacts, this bird might be a pre-breeding immature, i.e. first-year bird. Without more data on breeding cycles and moult timing, it is impossible to relate the observed pattern to any breeding season or population. Nevertheless, none of the other White-bellied Storm Petrels (e.g., Fig. 8) observed during the expedition had such advanced moult, rather all were fresh or only slightly / moderately worn, suggesting that they were just starting to breed or in the middle of their cycle (presumed autumn–winter breeders).

Discussion

We believe that the bird photographed represents a 'dark morph' or 'dark form' in the *F. grallaria* complex. Its relationships to the local population of the Juan Fernández archipelago (*F. g. segethi*) merit comment, as the bird concerned appears rather similar to dark-morph *F. grallaria* from Lord Howe Island. HS was unable to identify a single plumage difference from the latter.

No almost all-dark *Fregetta* has ever been recorded in the Juan Fernández archipelago, while no dark morph of *F. g. segethi* (which breeds on the Desventuradas Islands and the Juan Fernández) is known from museum collections or at-sea observations (e.g., Murphy 1936, Bourne 1983, 2014, Brooke 2004, Spear & Ainley 2007, Howell 2012; W. R. P. Bourne pers. comm., B. Robertson pers. comm.). Furthermore, in agreement with, for example, Murphy & Snyder (1952), Brooke (2004) and Spear & Ainley (2007), HS's previous work has revealed that only nominate *grallaria* shows such extreme dimorphism in plumage, with a wholly / mostly dark morph, which is confined to Lord Howe Island, and intermediate-patterned birds in the Kermadec Islands (pers. obs.; Bell *et al.* 1984, Tennyson & Taylor 1990). Furthermore, *Fregetta* around Tristan da Cunha, in the South Atlantic, also present some limited polymorphism, with some being dark-rumped, thus showing tendency towards Lord Howe birds (Howell 2012).

The bird appeared distinctly smaller with notably more advanced moult than any of the local *F. g. segethi* present. Earlier moult suggests earlier breeding. Irrespective of the bird's origin, there is already some evidence of seasonal populations of *F. grallaria* in the Juan Fernández. For instance, on Santa Clara (off Robinson Crusoe), fresh eggs have been found in January and fledglings in June (Brooke 2004), but also chicks of various ages in January (Murphy 1936).

It is interesting to note that there were very few *F. grallaria* around Más Afuera in March 2013, where the dark bird was seen, with the vast majority (90%+) of *F. g. segethi* observed during our field work being east of the oceanic ridge between Robinson Crusoe and Más Afuera, and the largest concentrations around the former or up to 50 nautical miles to the east. Similarly, in May 1983, Bourne (2014; W. R. P. Bourne pers. comm.) observed 24 *F. grallaria* off Robinson Crusoe, but none off Más Afuera. In the Juan Fernández, at least in

recent decades, breeding by *F. grallaria* has only been proven on Santa Clara (Murphy 1936, Brooke 2004).

To conclude, we consider two possible scenarios to explain the origin of the bird we observed. 1. A vagrant dark morph from Lord Howe (nominally *grallaria*), which is the most parsimonious conclusion, given its identical plumage and that these islands are the only locality from which such plumage is known. If so, the bird had wandered at least 10,500 km from its breeding site (straight-line distance from Lord Howe to Más Afuera). The possibility of an aberrant individual seems very remote as the paler mottling on the belly and rump match the dark morph exactly. 2. The possibility that the Juan Fernández support a dark-plumaged *Fregatta*, perhaps representing a distinct population. However, until (and if) more such birds can be documented at sea and breeding is proven, it will be impossible to confirm the identity of the bird we observed. More chumming work, as well as nocturnal trapping, on the Juan Fernández might elucidate the status of this dark storm petrel.

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Gravid female birds cannot be determined by visual inspection

by David Perpiñán

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There has been recent interest in the report of the first bird photographed in flight with an obvious egg inside the body (Shirihai *et al.* 2014). According to Shirihai *et al.* (2014: 218), the photograph shows a Mascarene Petrel 'at sea with a large egg in the uterus', and the swollen area just above the cloaca indicates 'that it is indeed an egg and not an abnormality or growth'. The authors believe this to be 'the first record of a petrel or any other sea- or landbird to be photographed in flight with an obvious egg inside the body'.

However, close scrutiny of the image (Fig. 36, p. 220) reveals that the mass could represent many different structures, an egg being just one possibility. The reproductive tract in birds occupies the dorsal area of the coelomic (abdominal) cavity, with the ovary sited near the cranial pole of the kidney, and the uterus running ventral to the kidneys and emptying into the dorsal aspect of the cloaca (Orosz *et al.* 1997). When an egg forms in the uterus, the pressure on the intestines (which are located ventrally) can sometimes produce a diffuse abdominal swelling (= abdominal distension), which generally is not visible due to the presence of feathers (Fig. 1). Abdominal distension caused by an egg within the uterus is indistinguishable from that caused by conditions such as reproductive disease (enlarged uterus, retained ovarian follicle, egg yolk coelomitis), coelomic effusion, gastrointestinal dilatation, obesity, abdominal wall hernia, or enlargement of any internal organ due to inflammation or neoplasia (Oglesbee 1997). Because petrels are long-lived (Warham 1996), such conditions may be more likely than in short-lived birds.

Petrels lay very large eggs relative to their body size (Warham 1990). However, other birds lay even larger eggs relative to their body size, e.g. kiwis *Apteryx* spp. (Morgan 2008). Gravid kiwis, like most birds, are visually indistinguishable from non-gravid ones (R.



Figure 1. Pacific Parrotlet *Forpus coelestis* with abdominal distension caused by an egg-yolk coelomitis; the abdominal distension is not usually noticeable unless the feathers are soaked or removed (David Perpiñán)

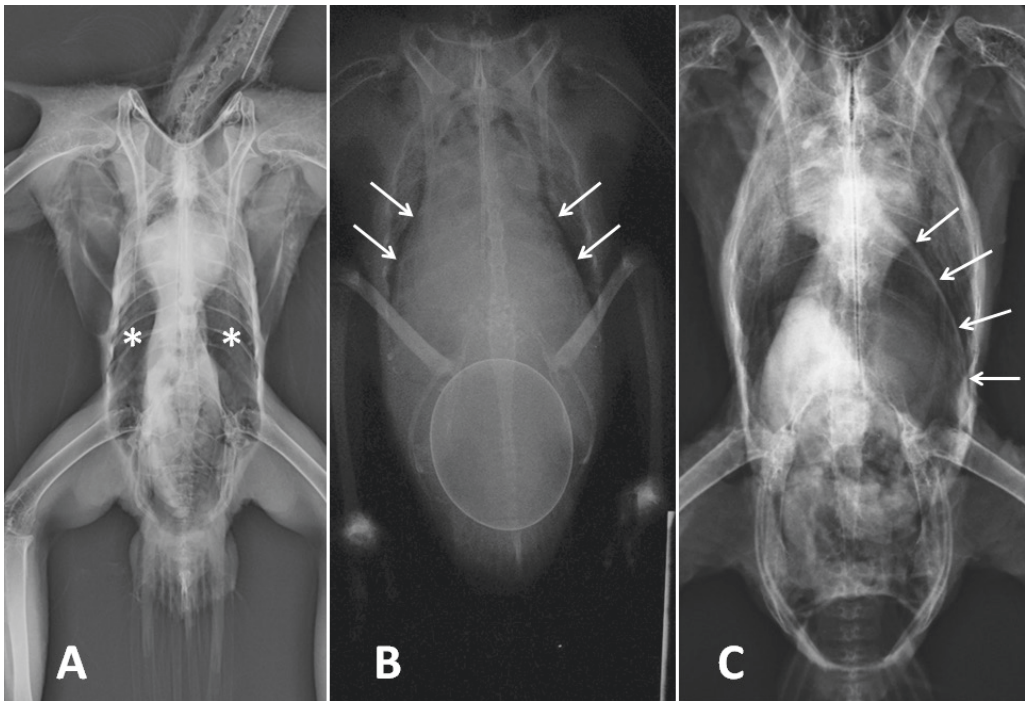


Figure 2A. Ventro-dorsal radiograph: normal anatomy of a Saker Falcon *Falco cherrug* showing the extent of the air sacs (asterisks).

Figure 2B. Ventro-dorsal radiograph: the abdominal organs of this Eclectus Parrot *Eclectus roratus* have been pushed cranially by an egg, compressing the air sacs (arrows).

Figure 2C. Ventro-dorsal radiograph: Salmon-crested Cockatoo *Cacatua moluccensis* with a dilated proventriculus filled with air. The enlarged organ (arrows) occupies part of the air sacs.

Aguilar pers. comm.). A radiograph of a gravid Bonin Petrel *Pterodroma hypoleuca* published by Warham (1990) shows a large egg within the abdominal cavity, but no abdominal distension such as that photographed by Shirihai *et al.* (2014).

Petrels have a highly distensible proventriculus that can store large quantities of food, especially during the breeding season when adults return to feed their chick after being at sea several days (Warham 1996). In these situations, the proventriculus can store food representing up to 25% of the bird's body weight (Schultz & Klomp 2000), exceptionally up to 32% (Warham 1996). There have been reports of gorged birds being unable to fly (Warham 1996). A proventriculus dilated with such quantities of food would create a similar intra-coelomic mass as an egg. However, either a large egg or a large proventriculus is unlikely to cause a markedly distended belly such as that in the Mascarene Petrel photographed by Shirihai *et al.* (2014), as the air sacs usually absorb the 'extra' volume (Fig. 2).

The significant bump observed by Shirihai *et al.* (2014) is also compatible with an extra-abdominal mass, e.g. a lipoma (a fatty lump growing under the skin) or even an abdominal hernia. An example of a bird with a lipoma resembling the Mascarene Petrel under consideration is shown in Fig. 3; this obese Budgerigar *Melopsittacus undulatus* invalidates a statement by Shirihai *et al.* (2014) that 'The swollen area is just above the cloaca, indicating that it is indeed an egg and not an abnormality or growth'. Petrels are well known for storing subcutaneous fat, although this is best known in chicks and pre-migratory individuals (Warham 1996, Schultz & Klomp 2000).

Petrels have been studied for decades. Extensive reviews of their biology (including anatomy, physiology and breeding behaviour) have been published (Warham 1990, 1996). However, a similar finding to that suggested by Shirihai *et al.* (2014) has not been reported, despite many breeding-season studies involving captured birds; instead, researchers have relied on brood patch and swollen cloaca to indicate a breeding female (Warham 1996). That this abnormal finding should be reported for the first time in a very rare petrel is bizarre, especially given that Shirihai *et al.* (2014) suggested it to be a normal egg in the uterus. This claim requires further evidence (radiography, or observation of the bird laying the egg and the distension disappearing, etc.), which the authors were, of course, unable to provide. Even if future studies confirm that Mascarene Petrel is exceptional amongst birds in developing a severe abdominal distension associated with normal egg laying, the bird photographed by Shirihai *et al.* (2014) could still be representative of another condition.

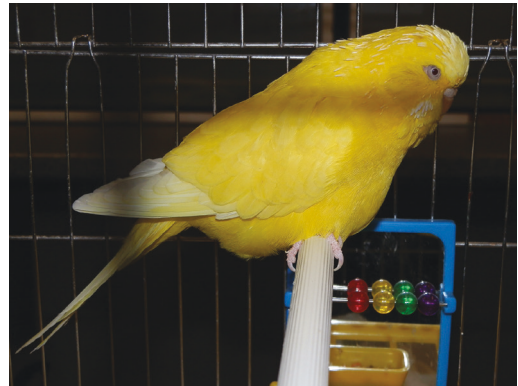


Figure 3. Budgerigar *Melopsittacus undulatus* with fat deposits in the subcutaneous area of the abdomen (David Perpiñán)

Overall, there are many explanations for the mass observed in the image in Shirihai *et al.* (2014), an egg within the uterus being just one possibility, and probably not even the most likely. The presence of a fully-formed egg within the uterus cannot be diagnosed in birds by visual inspection, and even palpation is only partially effective in diagnosing such cases in other avian species (Joyner 1994). Birds, including petrels, do not show such an obvious abdominal distension before egg-laying, and any deviation from this should be properly proven. Shirihai *et al.* (2014) lack any evidence that the abdominal distension they reported was an egg, and they cannot even be sure that the bird was a female. Any conclusions concerning the species' breeding cycle, including laying dates, based on the photograph in question should be treated with much caution. I am commonly presented with captive birds with abdominal distension and the cause can be diagnosed only following palpation, radiography, endoscopy, etc. Ornithologists should consider the many possible explanations for abdominal distension in birds.

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Response to ‘Gravid female birds cannot be determined by visual inspection’

We did consider if the lump in the photograph of Mascarene Petrel *Pseudobulweria aterrima* (Shirihai *et al.* 2014: 220) could be a tumour, cyst, abnormal growth, internal injury, even debris of some sort attached to the body. We felt that it represented a fully developed egg for the following reasons.

Eggs are disproportionately large in petrels, all effort being put into the single-egg clutch. The egg of a storm petrel, for example, can represent 30% of an adult female’s mass, while a radiograph of a female Bonin Petrel *Pterodroma hypoleuca* (Warham 1990: 281) shows the egg can be 50% the length of the body. Egg size in Mascarene Petrel is unknown, but Villard *et al.* (2006) published dimensions for the closely related Tahiti Petrel *P. rostrata*. The culmen length to egg length ratio in that species is 1:1.71 (using mean measurements of females from New Caledonia, south Pacific) and assuming this ratio to be the same for Mascarene Petrel, the egg would sit where the lump is visible (Fig. 1). The position of the ‘bump’ is correct when also considering the locations of the cloaca and uterus in the long body of *Pseudobulweria* (Fig. 1). Dissection of two congeneric species, Beck’s *P. becki* and Fiji Petrel *P. macgillivrayi* (Figs. 2–3), confirm this.

In the hand, we have found that several species of petrels can show the obvious outline of an egg and this produces a distinct ‘bump’. A female Providence Petrel *Pterodroma solandri* captured on Lord Howe Island in late May 2004 on its arrival from the sea had a visible ‘bump’ of similar shape and the same location, though seemingly even larger than

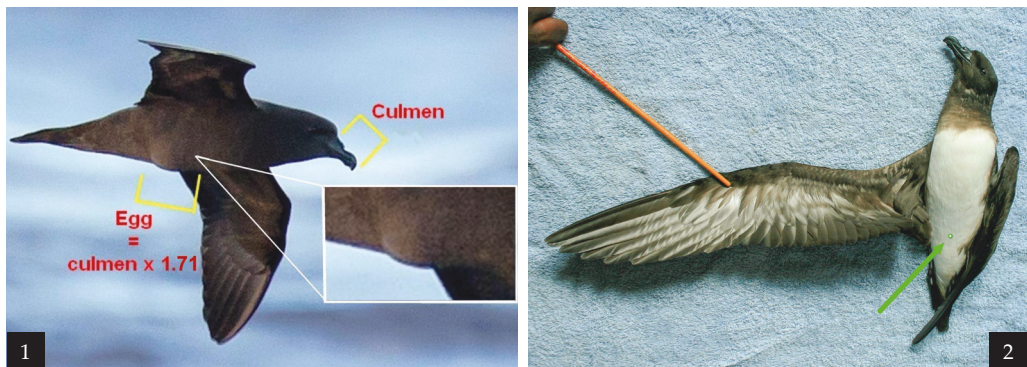


Figure 1. Mascarene Petrel *Pseudobulweria aterrima*, off Réunion, December 2012, with what we believe to be a large egg in the uterus; swollen area located just above the cloaca. Graphics show likely ratio of culmen:egg (cf. Villard *et al.* 2006 for measurements) (Hadoram Shirihai, © Tubenoses Project)

Figures 2–3 (facing page). Two *Pseudobulweria* petrels (left, Beck’s *P. becki* and right, Fiji Petrel *P. macgillivrayi*) that were subsequently dissected; the green dots indicate the approximate location of the cloaca in each case. In *Pseudobulweria*, the cloaca is more forward than expected, due to the long body and tail (Hadoram Shirihai, © Tubenoses Project)



that of the Mascarene Petrel photographed (HS pers. obs). Equally, a female Cape Petrel *Daption capense* handled by VB (Adélie Land, December 1985) showed a similar 'egg bump'. However, neither of these birds was seen in flight, so we cannot describe the bump in aerial profile.

The extraordinary breeding biology of petrels must also be considered. We believe this photograph fortuitously captured a Mascarene Petrel returning to its colony from the pre-laying exodus (a period at sea following mating and during which the egg develops). On arrival most females move quickly to their burrows to lay the by-now fully-formed egg, thus their timetable is very different to the vast majority of birds; the single egg is laid the same night that they return (Warham 1990; VB pers. obs.), unlike most birds that sit on, or stay around, their nests day and night for a duration of *c.*24 hours, permitting time for an egg to travel the reproductive tract.

We have observed illness and deformity in wild birds, as well as tumours and growths in cagebirds, though none has shown any abnormality like this. In cagebirds, however, such deformations, including bumps in the abdomen, can change in shape and size as survival is potentially longer for birds in care. Thus, comparing caged with wild birds, petrels specifically, is not convincing. We remain convinced the bump shown by the Mascarene Petrel was an egg based on the information presented above, but accept that this cannot be conclusively proven.

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INSTRUCTIONS FOR AUTHORS

Authors are invited to submit papers on topics relating to the broad themes of taxonomy and distribution of birds. Descriptions of new species of birds are especially welcome and will be given priority to ensure rapid publication, and can be accompanied by colour photographs or paintings. Submission should be made electronically (preferred) to the Editor (GMKirwan@aol.com): if large (>20mb) files are involved, e.g. to include illustrations, please contact the Editor first. Submission can be made by post (to Guy Kirwan, 74 Waddington Street, Norwich NR2 4JS, UK); in this case send a copy on a CD, as **MS Word or Rich Text files** for PC. However, where possible, reviews, and returns of papers and reviewers' comments to authors will be undertaken electronically.

Papers should follow the general style:

Title—lower case, centred, bold
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Introductory section without a heading

Primary headings—lower case, centred, bold

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English names of animals should begin with capitals; give English name at first mention of every species.

Numerals—thousands separated by commas, e.g. 1,000, 12,000

Units of measurement, SI. Space between values and unit, e.g. 12.1 g

Statistical tests in the form: ($r_{28} = 3.12, P < 0.01$). ($X^2_3 = 7.31, n.s.$)

Citations to references in text: Author (Date); Author & Author (Date); if three or more authors—Author *et al.* (Date); or (Author(s) Date) etc.

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